ARCHITECTURAL & ENGINEERING

NEWS

MAY 1959 VOLUME ONE

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ARCHITECTURAL & ENGINEERING NEWS, 432 FIFTH AVENUE, NEW YORK 18, N. Y.

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This issue contains feature articles about the dynamic role luminous radiation plays in our ability to engineer environment through architectural form. Bob Gill interprets this continuous interplay of visual signals and architectonic images created by illumination controls.

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forecast

ELECTRIC EQUIPMENT INDUSTRY REVIEW

All-electric prediction

A revolution in the heating, cooling and lighting of tomorrow's homes is already in the research laboratories of today, according to Dr. S. W. Herwald, Westinghouse Electric Corp. research executive.

Speaking before the eighth annual meeting of the Building Research Institute in Pittsburgh on April 8th, Dr. Herwald predicted that the home of the 1970's will be an all-electric one—heated in winter, cooled in summer, and lighted all the year-round by *"solid state" devices* placed strategically throughout the house. Solid state devices have no moving parts, but perform their assigned function simply, silently and without mechanical parts of any kind. A typical solid state device of today is a transistor, or the rectifier found in the power pack of a toy electric train.

"Recent scientific and technological advances have made possible this new look for the home of the future," Dr. Herwald said. "Among the most important are the areas of thermoelectricity and electroluminescence.

"Thermoelectricity is the direct interchange of heat and electricity. An electric current, flowing through the proper combination of thermoelectric materials, causes the junction between them to cool. Reversing the flow of current causes the junction to heat. The temperatures attained are perfectly adequate for cooling or heating a room or, for that matter, for refrigeration or cooking. Either is available from the same materials at the flip of a switch."

In contrast to present methods in which hot water, steam or heated air is circulated throughout the home, thermoelectric heating and cooling requires only the flow of electricity. Heat is pumped *electronically* by "riding on" the electrons which constitute an electric current. Heat can be pumped into a room to heat it, or pumped outside to cool it.

Thermoelectric cooling and heating, Dr. Herwald said, will do away with the idea of a central heating system.

"Such a system would provide far greater flexibility than does any conventional heating system," he declared. "No central heating plant is required. Rather, a small heating unit in each room will independently maintain individual room temperatures at exactly the comfort required. Nothing moves through the house but a current of electricity."

Another area of research—electroluminescence—also will greatly affect the home of the 1970's, Dr. Herwald predicted. Electroluminescence is the production of light by glowing phospors that are directly energized with an electric current. Electroluminescent lamps take the form of thin, flat sheets, a little thicker than window glass. Their brightness can be controlled by the twist of a dial; the color can be changed by the twist of another. Such panels give a soft, even glareless light over a large area, as contrasted to present-day point or line sources of illumination.

"The latest advancement is to combine in a single operating unit all the advantages of both thermoelectricity and electroluminescence," the Westinghouse research executive reported. "Although still in the laboratory stage of development, our scientists recently have developed single panels which heat, cool and light, purely by solid state technology. One can visualize the day when the home owner may air-condition his home and light it in a color and brightness to suit its decor, all by panels built into its walls and all under precise control from a single dial.

"It is developments such as these, presently emerging from the laboratories of today, that will make the mechanics of tomorrow's living more convenient and comfortable than we can now imagine," Dr. Herwald concluded.

Electric heat increase

Of the nation's 46 million residential units, 370,000 are being heated electrically. Admittedly, this latter number constitutes a small segment of the total number of residences heated by conventional fuels—coal, gas or oil. However, the figure represents a dramatic upswing in the number of residences heated by electrical equipment. As recently as 1950, only 100,000 housing units were utilizing electrical heat—the overwhelming number of these being serviced by the cheap T.V.A. and Bonneville Dam power projects. This year, 50,000 new homes will be getting electrical heat, an increase of about 250 per cent over last year. Electric heating systems are now being installed at a rapidly increasing rate. Needless to say, the utility companies are delighted in this growing outlet for the sale of their electric power. As an inducement, rate schedules have been reduced in many areas, encouraging the use of electricity for heating, competitive with conventional fuels. Builders in some localities are given incentives to install electric heating systems—the two main types being the resistance and the heat pump.

Estimates state that it takes 16,000 KW hours of current per annum to heat a five-room house located in the midwest. This is approximately five times as much power required by the average home as for other electrical purposes.

Builders find construction savings in the elimination of the central furnace, chimney or warm-air duct work in addition to the fact that the wiring and heating work is done by the same subcontractor.

NEMA news

The nation's leading room air-conditioner manufacturers are predicting a record-breaking retail sales year for 1959. The sales of room air-conditioners are expected to reach between 1.6 to 1.75 million, according to Joseph B. Ogden, Chairman of the Room-Air-Conditioner Section of the National Electric Manufacters Assn.

Standards issue

To augument this bright picture given for the room air-conditioner industry, this section of the National Electrical Manufacturers Assn. has developed a NEMA product standard for room air-conditioners which includes the following key points:

1. Defines a room air-conditioner.
2. Establishes uniform procedures for determining the performance of room air-conditioners under specified test conditions.
3. Sets certain minimum characteristics for such units.
4. Provides that room air-conditioners built to NEMA standards shall carry a name plate on which manufacturers will give the unit's total cooling and/or heating capacity in BTU per hour as tested and rated under provisions of the standard.

The publication, designated as NEMA Standards Publication No. CN 1-1958 available from NEMA Assn. Headquarters, 155 East 44th St., New York 17, N. Y. for 30¢ per copy), covers such subjects as: rating and testing standards which include procedures to test for: *cooling capacity in air-cooled and water-cooled units, heating capacity, recirculated air quantity, ventilating and exhaust air quantity, electrical rating, power factor for air-water-cooled units, locked rotor currents, enclosure sweat, condensate disposal and safety.*

Code revision

The National Electrical Manufacturers Assn. and the International Assn. of Electrical Inspectors have concluded cooperative studies with agreement to sponsor jointly a proposed revision to the 1959 National Electrical Code concerning the interchangeability of circuit breakers.

The proposed revision will require that circuit breakers be non-interchangeable in equipments rated within the range of 0-250 volts, a-c, and not more than 100 amperes. Such breakers are used for lighting and appliance branch circuits and residential and other occupancies. Exceptions to the revision are circuit breakers which operate under conditions of maintenance and supervision which assure that overcurrent protective devices and branch circuit wiring will be maintained at proper rating.

The ampere range of breakers included in the proposed revision follow: 0-20; 21-50, and 51-100.

In referring to the agreement, members of the NEMA section said:

"The substitution of a circuit breaker with one containing a higher rating has long been objected to by electrical inspectors. The proposed code change will eliminate this practice and provide industry with a uniform set of requirements instead of a series of conflicting ordinances on this equipment."

Temperature control standard

Quick connect terminals, which have been manufactured over the years in such manner as to cause suppliers and users of automatic temperature controls no end of headaches, may no longer be among the industry's problem devices. A change for the better may come about as a result of a new standard issued by the Automatic Temperature Controls Section of the National Electric Manufacturers Assn.

The new standard calls for quick connect terminals to be one-quarter inch size. Also it assures manufacturers of appliances, room air-conditioners and other heating and cooling equipment in which automatic temperature controls are used that such terminals will provide positive connection. In the past both Underwriter's Laboratories, Inc., and industry have questioned this type of terminal because its use often resulted in poor connections and consumer dissatisfaction.

Standardization of such terminals is expected to make them more readily acceptable to UL and to industry.

gazette

The 55th convention awards of the American Concrete Institute were presented as follows: the Turner Medal to Douglas E. Parsons; the Wason Medal for Research to F. T. Mavis and M. J. Greaves; the Wason Medal for Most Meritorious Paper to John F. Brotchie; and the ACI Construction Practice Award to Jack E. Rosenlund.

William H. Wisely, Executive Secretary of the American Society of Civil Engineers, reappointed by Governor Rockefeller to New York State Public Health Council.

Professor Dr. Ing. E. Torroja, Madrid, Spain; the late Professor Hardy Cross, Yale University; and Professor H. J. Gilkey, Iowa State College, elected to Honorary Membership in the American Concrete Institute.

Donald D. King, PE, named Assistant to the Secretary of the American Society of Civil Engineers.

George Edson Danforth, AIA, will succeed Ludwig Mies van der Rohe, FAIA, as chairman of Illinois Tech's department of architecture, effective September, 1959. Danforth is currently serving in the same capacity at Western Reserve.

Myrl J. Hanes, AIA, of the Florida North Chapter, was named Gainesville's "Outstanding Young Man of the Year," for his energetic activity in the adoption of major zoning and subdivision ordinances, and a slum-clearance, low cost housing program in Gainesville, while in second term as Mayor-Commissioner.

The National Academy of Design recently elected William Platt, FAIA, of the New York Chapter of AIA, as treasurer of its Council. John F. Harbeson, FAIA, of Philadelphia, was elected President. Gordon Bunshaft, FAIA, and Michael Rapuano, both of New York, were the architects elected to Academicianship this year.

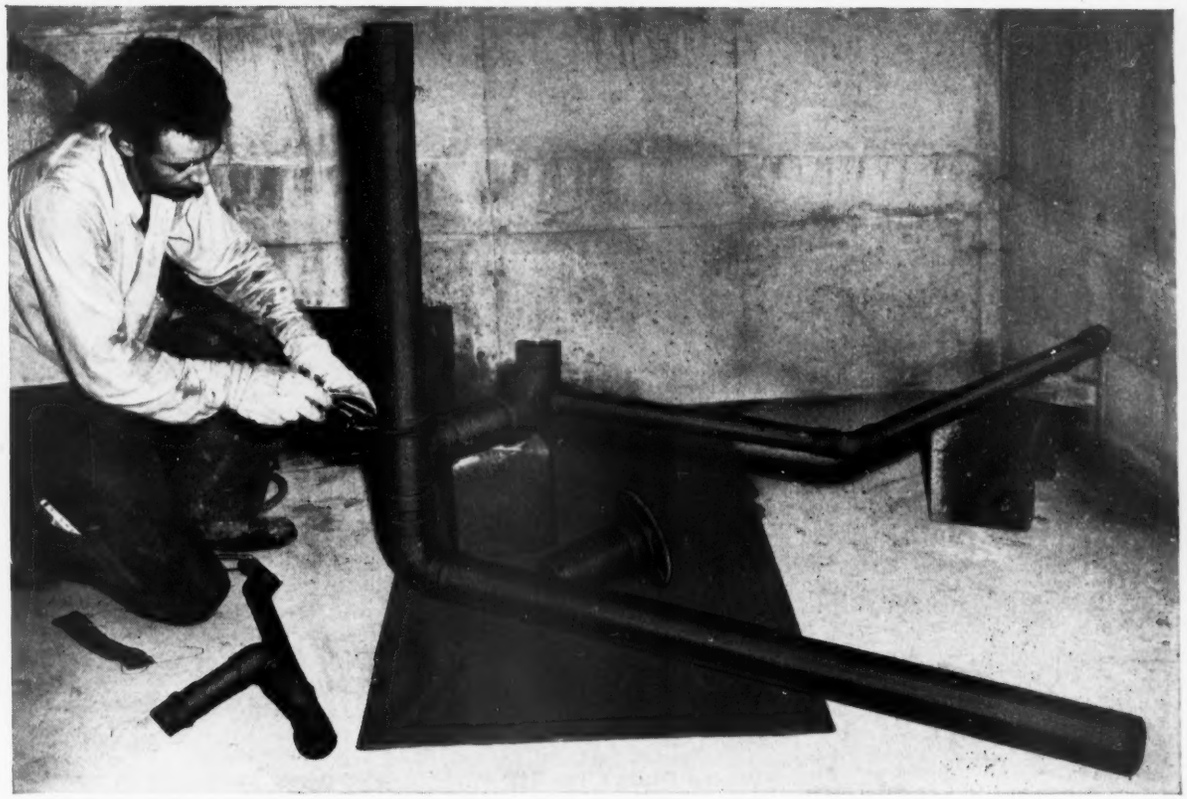
Office announcements

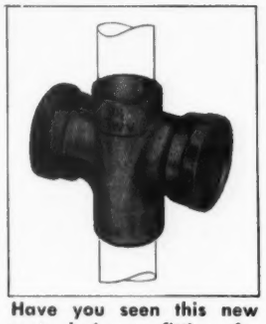
Robert C. Burns Associates, Consulting Engineers, to new address at the Suburban Station Building, 1617 Pennsylvania Blvd., Philadelphia 3, Pa.

Leon Brown, Architect, to 1640 Wisconsin Ave., NW, Washington 7, D. C.

Ula L. Manning, Architect, to 309 Brent Building, Pensacola, Fla.

Charles Luckman Associates, architectural and planning firm of Los Angeles and New York, announces a series of appointments: Peter Munselle, AIA, to chief designer; Richard C. Niblack, to director of design; Max R. Horowitz, AIA, as vice president and director of architecture; and Donald L . Perry, Lt. Col., USAF (Ret.) as director of aerospace development.





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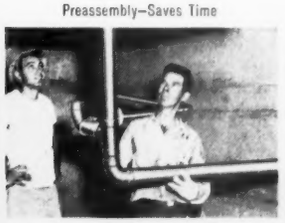

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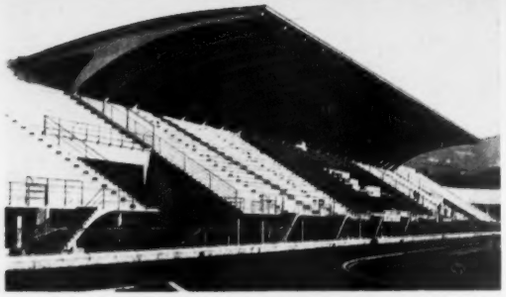
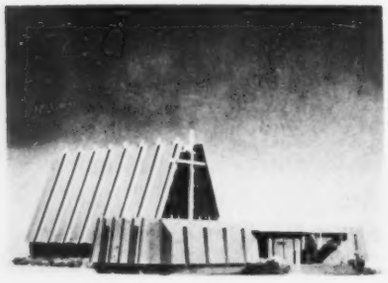


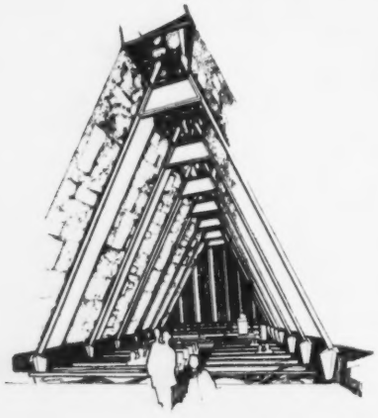
A first major exhibition in the U.S. of the work of famed Italian engineer, Pier Luigi Nervi of Rome, was given recently at the Architectural League of New York. The exhibition, prepared by Nervi himself, will tour U.S. Shown is an early project, the Stadium in Florence with its 75-foot roof cantilever. Photo: courtesy the Museum of Modern Art.

ae news

Belleville Church

Model of new Protestant Chapel planned for New York International Airport. (above) Exterior will be oxidized copper alloy. Latin cross plan which at horizontal crossing houses reception, office and counseling areas. Chapel proper will be formed of series of concrete A-frames bents rising 35 feet and ending in rhythm of copper pinnacles. Chapel's ceiling and areas at ends will be of colored antique glass. (below) Architect: Edgar Tafel, AIA.





White Plains facility

A headquarters building for the New York Telephone Co. at White Plains, N.Y. has been announced for completion in 1961. Plans call for a three-story and basement structure to be 332 feet long and 156 feet deep and contain over 150,000 square feet of usable floor space. The contemplated architectural design will utilize grey brick and tinted glass for exterior finish. Architects are Perkins and Will of White Plains and Chicago.

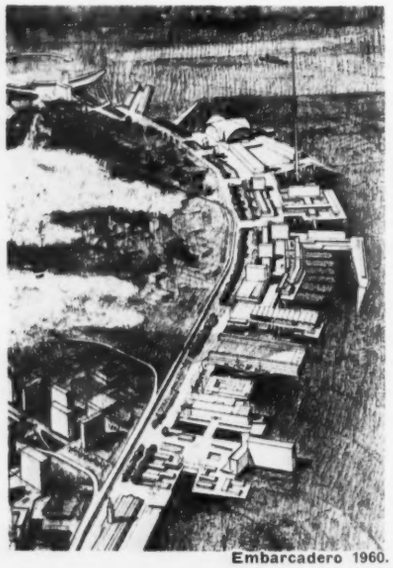
WP facility. Rendering: Schwartz

Embarcadero 1960

San Francisco will have a new frontier in the projected redevelopment of 95 city-blocks of its waterfront—the Embarcadero. To be completed at a cost of $300 million, the project calls for hotel, sports, office, fashion shopping, theatre, art, boating and other recreational and entertainment facilities. Architects are John S. Bolles, AIA, and Earnest Born, AIA, of San Francisco.

Open plan church and school

A campus type site development providing a church building and a series of one-story classroom units is announced for the Hillcrest Christian Church of Belleville, Ill. The buildings feature laminated wood prefabricated, stressed skin, folded plate construction. The church unit, seating 300 persons, will be the first to be built in the project at a cost of $93,000 ($15.30 sf). Architect for the program is William M. Cooley, AIA, and Associates of Park Ridge, Ill.



Embarcadero 1960.

Top-layer status

Top-layer or "highest" status was accorded licensed architects in a seven-layer status research cake recently published in an article in *Look* magazine. A ranking of occupations by prestige, as reported by sociologist Bevode C. McCall, assigned a status rating to each major occupational group based on an analysis of the skill and responsibility involved. About 300 occupations were given a rating from one to seven. Top ranking or "highest" status group was given to RA's, along with the stockbroker, medical specialist, executive of a national concern, Federal judge, law partner in a prestige firm, flag-rank military officer and a Bishop, D.D. The report appeared in connection with an article written by Vance Packard on "The Pursuit of Status."

Taliesen workshops

The famous workshops, Taliesen West at Scottsdale, Ariz. and Taliesen at Spring Green, Wis., conducted by the late Frank Lloyd Wright, will be continued in the same manner by the Frank Lloyd Wright Foundation.

Olgivanna Lloyd Wright, his widow, will serve as president of the foundation and its executive officer. Eight architects closely associated with Mr. Wright will function as board of trustees. The group will carry to com-

pletion the great amount of work left in various stages of development in addition to undertaking new commissions.

AIA portfolio

College buildings at Concordia Senior College, Fort Wayne, Ind. and at Wayne State University, Detroit, Mich. were among the five projects selected to receive First Honor Awards in *The American Institute of Architects'* 1959 competition for outstanding architecture. Eero Saarinen & Associates, Birmingham, Mich. designed Concordia and Minoru Yamasaki & Associates also of Birmingham, Mich. served as architects for the McGregor Memorial Community Conference Center at Wayne State University.

Other top awards were given for the Washington Water Power Co.'s Central Service Facility, Spokane, Wash. designed by Spokane architects Kenneth W. Brooks & Bruce W. Walker; May-D&F Department Store in the Zeckendorf Plaza Development, Denver, Colo. by I. M. Pei & Associates, New York with Ketchum & Sharp, New York, Associate Architects; and the Diaz-Simon Pediatric Clinic, New Orleans, Colbert & Lowrey & Associates, Architects.

In addition to the five First Honor Awards, the jury made ten Awards of Merit, for a variety of projects including two schools, three residences, a supermarket, two religious buildings, an office building and a tourist center.

Professor Walter Bogner of Harvard University's Graduate School of Design was chairman of the all-architect jury. In selection of the winners from among the 332 submissions, the jury was guided by three primary considerations: architectural distinction, totality of solution and the character of the design.

The Honor Awards Program was established by the AIA in 1949 to encourage the appreciation of excellence in architecture and to afford recognition of exceptional merit in recently completed buildings. Eligible to submit work is any registered architect practicing professionally in the U.S.

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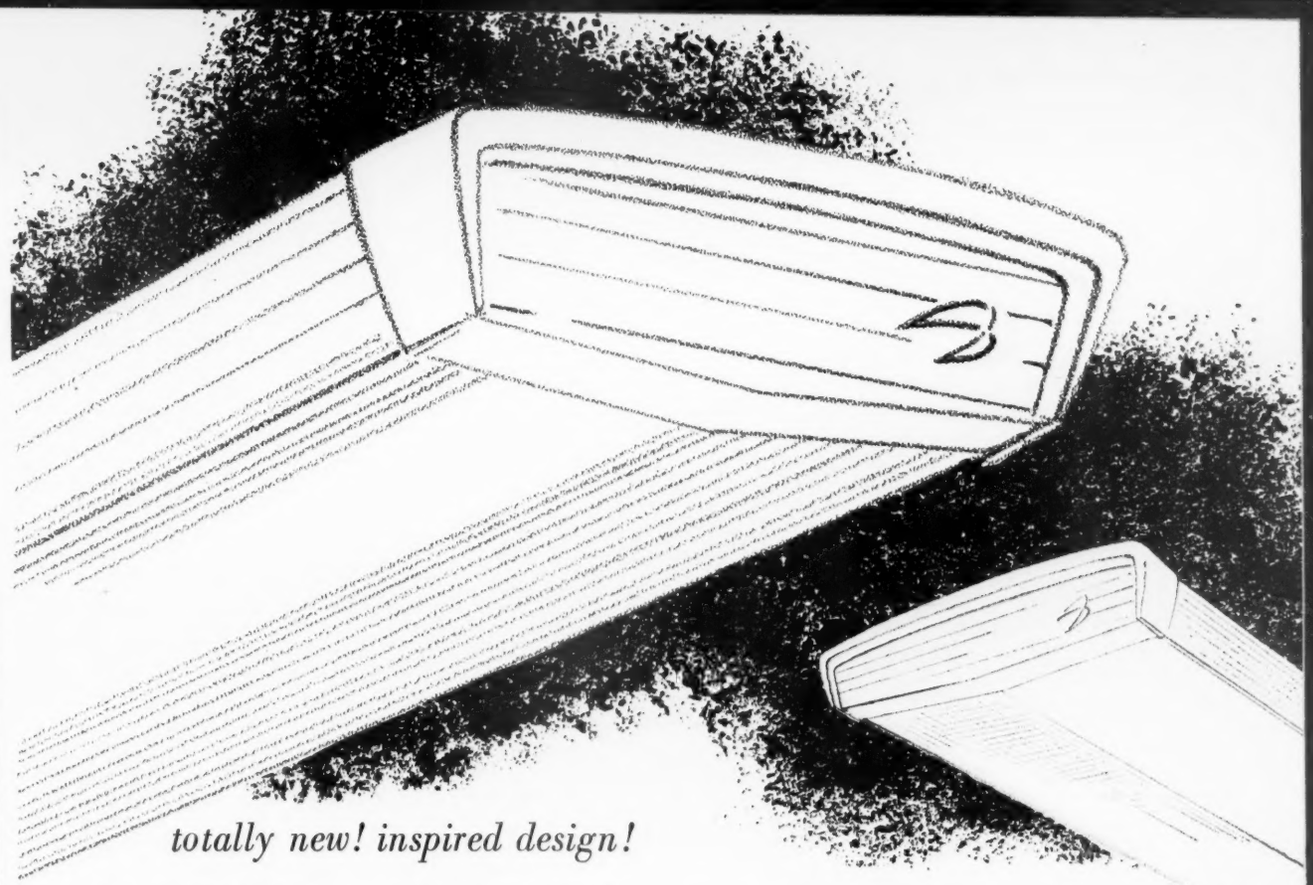

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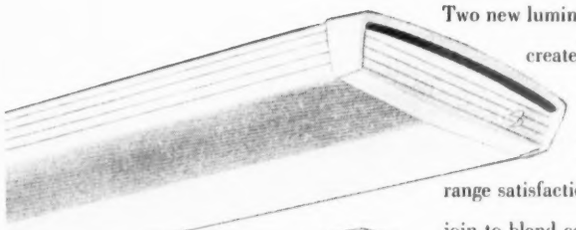

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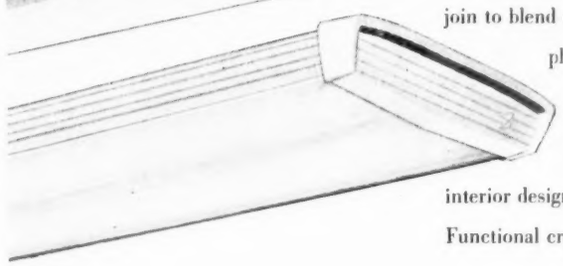

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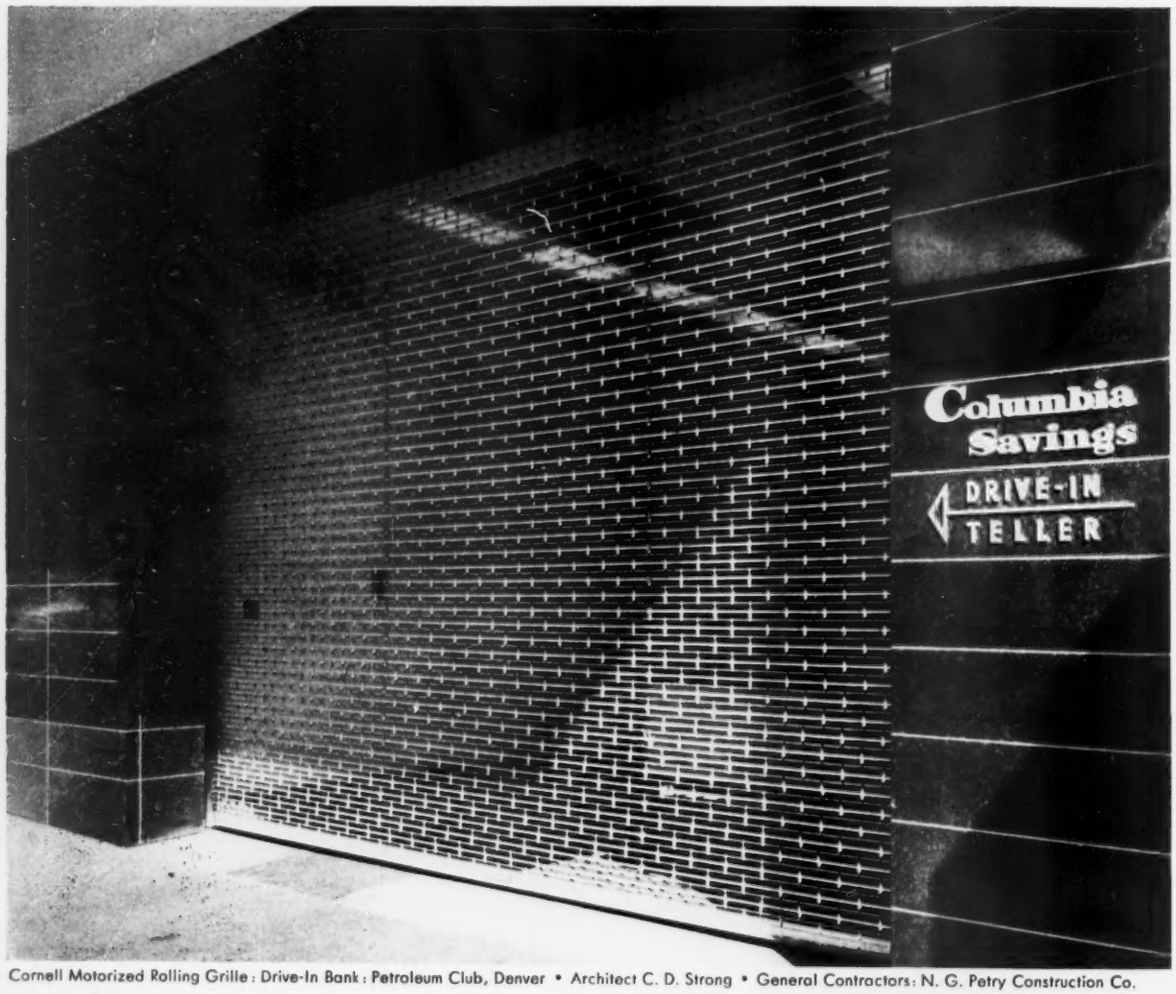

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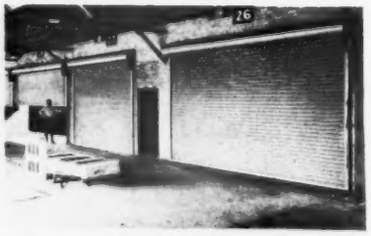

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communications

AE NEWS welcomes the opinions of its readers. Letters should be addressed to: Editor, Architectural and Engineering NEWS, 452 Fifth Ave., N.Y. 18

Editor:

Have read with great interest your March issue. It is very stimulating, especially the manner of direct and factual presentation.

Also the Preview #3 on page 25, giving the entire program and solution of an entire project (Church by William M. Cooley, AIA and others). A short description of the site might be of help—square feet in area, zoning problems, etc.

With the office loaded with activity, I am sure you will overlook this brief pen scribble. But I did want to give you a reader "sampling" opinion of your fine efforts.

Sincerely,
Willard Hirsh
Architect & Engineer
Cleveland Heights, Ohio

Editor's note: Thank you for your kind remarks. We appreciate your suggestions, as from other readers. Your comments function as a "pilot" to our editorial position in furnishing a service to readers.

Architect's tour

Editor:

Would you please find space for the following announcement in your next issue?

The 4th Annual Architects' Tour of Japan, again led by Kenneth M. Nishimoto, AIA, of Pasadena, Calif., will leave from San Francisco on October 13 by a Pan American World Airways' carrier. Ship accommodation can be arranged also.

This deluxe tour will travel in Japan for 22 days, sightseeing and studying magnificent gardens and architecture. Six hundred miles have been added to the previous year's itinerary, thus making this year's program more comprehensive.

The group will attend the architect's convention in Kyoto and conference with architects in Tokyo. Also on the schedule is a visit to an architect's office and a house under construction.

The convention-attending architects at the Pacific Rim Conference in Honolulu will join the party and board the same flight from that city late in the evening of October 13th. Descriptive brochures are available.

Sincerely,
Kenneth M. Nishimoto, AIA
263 South Los Robles Ave.
Pasadena, Calif.

Industry comment

Editor:

Congratulation to *A/E NEWS* for the sorely needed classification of plastic components related to the

(Continued on page 11)

FRANK LLOYD WRIGHT

Michaelangelo of the 20th century

The mortal man of nine decades is no longer among us. It is with great sorrow that we record his passing. He will be sorely missed. Yet, to his last breath, this powerful empyrean spirit beckoned us to treasure life . . . "to consider the present as the ever moving shadow that divides yesterday from tomorrow . . . in that lies hope . . . that night is but a shadow cast by the sun."

Wright left us this imagery of an architecture sustained by a hope deep and rich in meaning for human existence.

It was his firm belief "that human culture has a healthy sense of the beautiful as its life-of-the-soul: an aesthetic organic—nobly relating man to his environment. The sense of this natural aesthetic would make a man a gracious, integral, potent part of the whole of human life. Ethics, Art and Religion survive in civilization only as departments of this aesthetic sense, and survive only to the extent that they embody human sentiment for the beautiful. To ignore this truth is to misunderstand the soul of man, to turn him over to science ignorant of his true significance; and to remain blind to his destiny."

Thus Wright, the poet spoke—untouched by a sanctimonious humility. He exhorted with the rolling and thundering preachment of a proud patrician—a vesuvian aristocrat of the mind—acknowledging no peer.

His restless creative energies generated an architecture, the intellectual, aesthetic and typically American vigor of which, has been emulated throughout the remotest corners of this earth.

We are familiar with his many works. They defy imitation since they exist as teleological entities—absolute, personal statements of Wright's philosophy: that the architect is the trustee and conscious molder of his materials in a specific environment—a primemover of scientific experience—in order to harness the infinitely beautiful challenge of Nature's splendid work.

A life-long critic of the American scene, Wright reserved some of his most scathing and imperious comments for his fellow architects. Yet, his criticisms arose, not from rancor and guile, but from the full-blooded Emersonian passion of an architectural romantic. Intensely intolerant of intellectual mendacity and meritriciousness in others, he spared no one in his volatile views. Through his writings, conversations, lectures and his architecture, he forged an image of an American architect—unfettered by the European academies, casting off the ritual and the cant of hollow tradition.

To Wright, we owe much of the lay-public's respect for the individual architect. He motivated this understanding by pricking the pompous through outrageous pronunciamentos on architecture.

Ultimately, the word *architect* became synonomous with the word *Wright.*

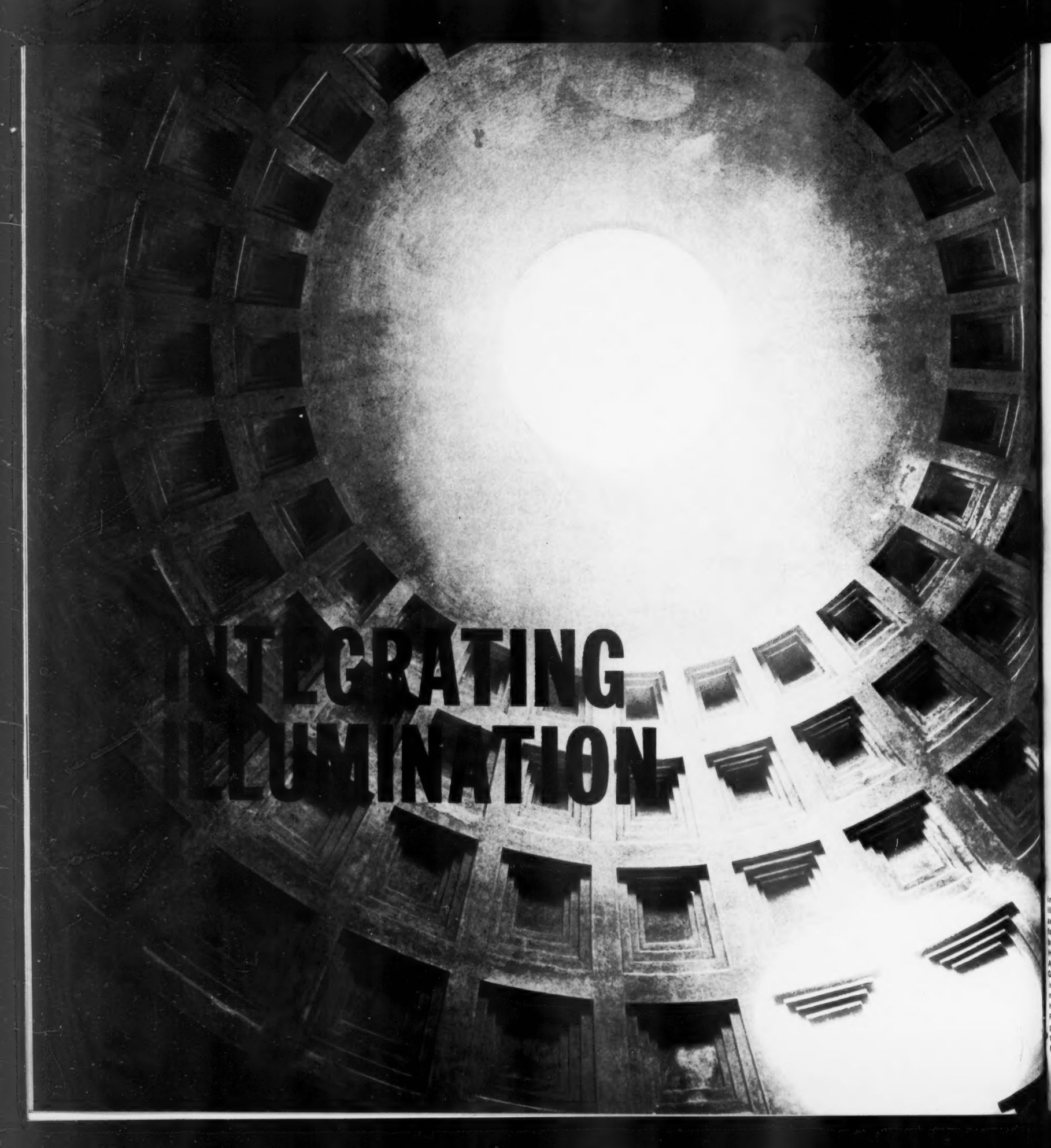
From the early Chicago days, Wright stimulated an interest in an architecture born of American experience and American ideals. His own development and his championing the cause of his beloved teacher, Louis Sullivan, attracted to these shores professionals and students from the world over.

Wright's work and teachings will survive the shifts of time, of fashion, and of his detractors. His memory belongs not only to our profession—but it is part of our national heritage serving as an inspiration to countless numbers everywhere.

In marking his passing, we recall his writing in *The Living City:* "when a great Oak is to die, a few yellow-green leaves appear on topmost branches."

The great oak *has* died and the few yellow-green leaves appear on topmost branches—the prophetic vision endowed to all of us by Frank Lloyd Wright.

JJC


INTEGRATING
ILLUMINATION

INTEGRATING ILLUMINATION

by Henry Wald, PE, NSPE

a major obstacle to integrating illumination in architecture is the often unconscious neglect by the architect of this planning area during critical stages of a project's development. A provocative view of the subject is offered by a well-known consulting engineer.

As a concept of architectural design in contemporary practice, lighting is generally accepted as an integral part of environmental control, if not completely understood. Use of the word "element" involves a connotation that reference is being made to a separable portion of design that can be added or subtracted at will—although no element seems least separable from the form, structure, color or texture composing the total space. Lighting is so integral a part of architecture that any variation in its composition, intensity or distribution must create a corresponding variation in the effect on the space in which it is present.

Perhaps it is more difficult for the architect to produce a final design with a total integration of all aspects of environmental control than to produce a design where he merely "coordinates" the various "trades," as they are termed in the written construction specifications. Aside from this generally existing situation where greater educational effort must be expended, there is a singular road block in some areas of architectural practice.

Quite often, the major obstacle toward successful solution of the illumination problem is an unconscious neglect of the illumination *during critical planning stages.* The architect may have been well taught and retained the feeling that he must consider lighting within the scope of his over-all design; but often he treats this element in a perfunctory manner—an element which is so vital to defining his space, materials and the mood of the human occupants of the space and which facilitates the ability of the occupants to function. Such a mode of treatment may be understandable when one considers the ever present, multi-directional pressures on the architect. He is concerned with designing buildings employing advanced contemporary facilities and systems for environmental control. However, merely understanding the pressures and expressing sympathy with his plight does not automatically solve his problem.

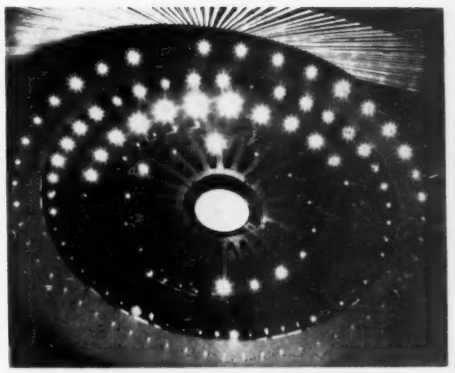
It should be noted, in all fairness, that other aspects of this over-all problem of environmental control are treated with a certain disregard for their importance in the total building program. For example, air conditioning, plumbing, and noise control, are environmental controls that are "patched-in." Accordingly, neglect of the so-called "mechanical trades" is not peculiar to the field of lighting.

Extensive lip service is rendered to the idea of including lighting within the entire concept of the architect's design. In actual practice, lighting is frequently treated as an appendage to the space.

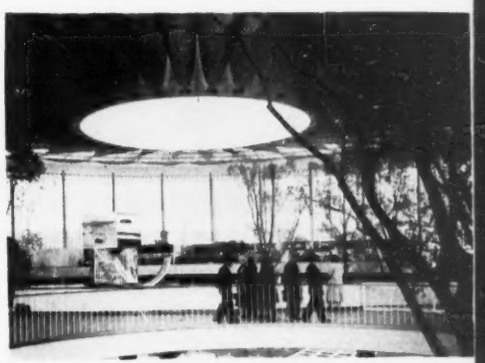
There may have been a definite visual concept in the architect's mind, or even a concept delineated on paper showing lights, shadows and color values. Yet, the end result may be unachievable because the structure of the space does not allow installation of a system to produce the pre-determined effect. A design for new construction often becomes, at the outset, an *alteration job* with respect to the lighting system. The lighting designer is faced with adjusting his design to the limitations of a fixed structure within a rigid program.

Invariably, the architect is fairly adept at considering the important illumination effects resulting from the existence of window or skylight areas, but often does not display equal skill in predicting the effects of artificial illumination. This is antithetic to what one might normally expect, since we ordinarily conceive of daylight as a completely dynamic light source, difficult to control because it varies not only in intensity and direction, but also in spectral composition, as opposed to the relative non-variance of artificial light sources. On this point, we suspect that the common human experience of observing daylighting effects in addition to profound emphasis given to daylighting in the study of architectural history has led to an *unbalanced appreciation* of the place of artificial lighting in contemporary design. Unbalanced emphasis was natural until the advent of low cost electrical power in this century. However, consider the amazing advances that have been made in the recent past decades in the technology and economics of light production. One can only wonder why not more than a minority of today's architects are even trying to tip the imbalance. Daylighting has a necessary place, but the validity of the imbalance in its direction is questionable.

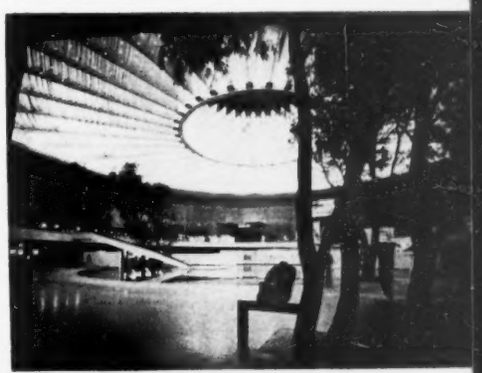
Note for example, the magnificent dome of the Pantheon of Ancient Rome punctured by its oculus which so effectively utilizes overhead daylighting. Contrast this with the dome of the United Nations Building, providing much the same feeling, in much the same structure, but representing a controlled environment created by the architect to be independent of nature's caprices. *(Continued next page)*



A controlled environment created by Architects Harrison & Abramovitz to be independent of nature's caprices. Shown is interior view of the dome over the General Assembly Hall of the United Nations. Four rings of floodlights, focused on the delegates, illuminate the Hall. Lighting Consultant: Abe Feder. (Photo: courtesy UNATIONS.)



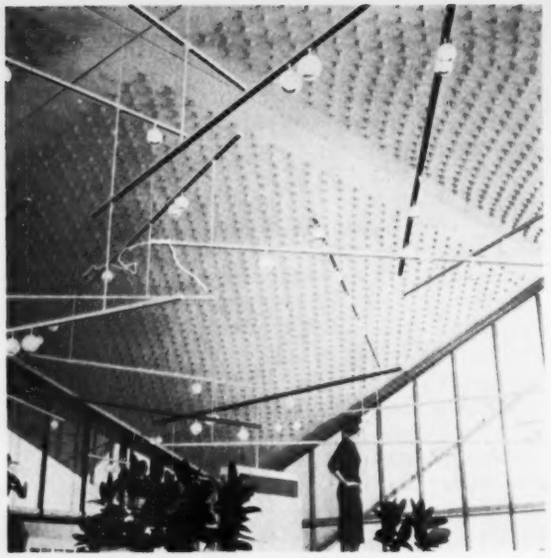
A startling contrast of environment control through illumination was created by Architect Edward Stone and Light Consultant Rollo Gillespie Williams for the United States Pavilion at the Brussels Fair. A difference in the building's appearance was created at night (below) in contrast to its illumination character during the day (above).



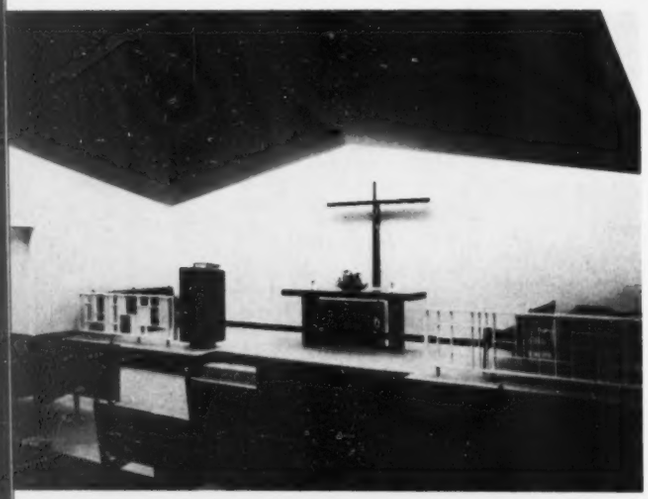
Integration of illumination with architectural form is found in the Pantheon built by the Emperor Hadrian (circa 120 A.D.). Photograph by G. E. Kidder Smith, FAIA, is from the presently nationally-touring exhibit, "The Ceiling: Forms and Textures" prepared by the Architectural League of New York.

** Henry Wald, PE, NSPE, is in private practice with his firm, Wald and Zigas, Consulting Engineers. His firm is a Sustaining Member of the Illuminating Engineering Society, a type of membership contributing to basic research and development in the science and art of illumination. They are the first consulting engineering firm in the New York area to attain such membership in the 50-year old history of the Society. In the IES, Mr. Wald has been elected to three terms as member of the Board of Managers and has served as Chairman of its Technical Forum and Architectural Lighting Competition Committees; also he is Lecturer at Columbia University on Environmental Control and Mechanical Equipment.*

INTEGRATING ILLUMINATION



Flexibility in display light (left) for the May Co. Dept. Store of Denver, Colo. is provided by a series of suspended tracks equipped with adjustable units. Interior designers were Architects Ketchum and Sharp with Morris Ketchum, Jr., FAIA, partner-in-charge. Architects were I. M. Pei and Associates. (Photo: Warren Reynolds). At right is seen functional egg-shapes created for operating rooms at hospitals in France, Holland, Belgium and Denmark. Architect: Paul Nelson, AIA; associated with Ketchum and Sharp, Architects; (Photo: Etienne Weill, Paris).



Chapel of the Darien Congregational Church, Darien, Conn., designed by Architects Sherwood, Mills and Smith (above) provides a dominant and dramatic architectural form integrated with its lighting system. (Photo: Robert Stahman). A synagogue for Congregation Beth El (below) in South Orange, N. J. provides at its elevated "Bema" and at the building's perimeter, clear glazing at the intersection of the roof. At night, interior ceiling planes are softly accented by concealed lighting. Architects: Davis, Brody and Wisniewski; Lighting Consultant, Henry Wald, Wald and Zigas, Consulting Engineers. (Photo: Ben. Schnall).

At the same time, one may contemplate another extraordinary example of a controlled environment through illumination, the United States Pavilion at the Brussels Fair, in which Architect Edward Stone and Light Consultant Rollo Gillespie Williams created a building startingly different in its appearance at night in contrast to its appearance during the day. To some critics of this unusual structure, it seemed to be more attractive at night without impairment to its function. This would suggest new possibilities or new vistas of investigation in the integration of light and architecture. A challenge may exist in creating an architecture for a different appearance and human response *at night* rather than feebly attempting to reproduce nature's light.

Why couldn't emphasis be placed on those principles which govern the control of electric light sources in order to tip the scales in the direction of encouraging maximum utilization of what is new and different in lighting? This is common procedure in other areas of architectural planning and design. Why couldn't there be a more widespread practice leading to exciting solutions of the lighting problem?

The mentioned examples of the Pantheon, the UN dome and the U.S. Pavilion could have been produced only within a design procedure primarily under the control of the architect, along with competent assistance from persons skilled in the science and art of illumination. Herein lies the dilemma at the crux of the situation. Consider the complexity of problems associated with a complete building design wherein the architect is called upon to understand and apply intelligently not only a vast new and continually changing series of light sources with appropriate utilizing equipment, but is also expected to comprehend a rapidly changing store of technological data significant to the application of radiant energy and its effects on space and the people in the space. For example, what particular "white" fluorescent lamp of the seven standard "whites" does one use? What is the justification for using 100 footcandles as a design criterion in lighting certain classrooms? Last year, before Dr. Blackwell's recently published findings were disclosed *(A/E NEWS; digest 1)*, 50 footcandles or less were recommended as satisfactory for optimum design.

The architect's dilemma, now as then, is this: how and where does one obtain the knowledge on which to base design. Lacking absolute, up-to-the-minute preparation for the complex problem, what does one do?

One answer may be had in Architect Derek Phillips' suggestions contained in the *Journal of the Royal Institute of British Architects (September, 1956)*. He stated that a course providing the following may be an appropriate program for architects:

(a) The characteristics of natural and artificial light sources, their spectral qualities. Illumination levels and economics and the special characteristics of sunlight.

(b) Criteria for lighting design. There is a need here for a clear statement by the schools, both in terms of technology as the means and the formal and functional requirements of lighting in buildings as the end.

(c) Methods of light control and optical systems. Principles of window design and design of lighting fittings (luminaires). Materials used and additive and subtractive mixture of color.

(d) Physical properties of surfaces to be lit, analysis of materials (in relation to lighting).

(e) Simple calculations for design of lighting installations, both natural and artificial, and the relationship between them.

(Continued on page 36)

communications

(*Continued from page 6*)

building field (*March issue: pp.40-41*). It is important to note that all important, but undefined, point regarding the so-called reinforced polyesters (*B-page 40*) depends mainly on the engineered reinforcement as related to final use. May we respectfully add to your non-proprietary list classification "*Glaceramic*" (*R*).

Glaceramic products are molded, one-piece utilizations now being styled for the building industry such as one-piece bathrooms, stall showers and vanity-bowl combinations which rely on interlocking molecular action of heavy glass rod weaving and cross gridding combined with color fused polyesters.

Structurals such as these could no more be described as relying on mats whether they be glass, paper, asbestos, cotton or shredded fibers, than could a structural such as a dam rely on being specified as reinforced with metal when metal could ostensibly mean any ferrous materials in its multitudinous forms, shapes, weights and fabrications. In addition to servicing the building field, other *Glaceramic* structurals must hold tolerances to withstand impact and corrosive chemicals demanded by military and industrial users, and when molded for the plumbing trade meet those rigid specifications set by the Bureau of Standards.

The importance of the educational value of what you are doing cannot be overemphasized. Those manufacturers who serve the best interests of the building industry are vitally concerned with the formulation and enforcement of such standards. Much of the warranted acceptance of these new material applications has been hindered by lack of understanding, and, therefore, proper enforcement of the standards. This permits so-called "reinforced" products to be marketed for structural uses without proper attention as to what constitutes engineered reinforcement.

Unfortunately for the trade, a polyester laminate layered over paper mat and random fibers may look identical to the properly formulated structural which can be guaranteed against the impacts and chemical attacks of its final finish. It is this erroneous concept and disregard for engineered reinforcement which has brought to light the so-called disadvantages of fibrous glass reinforced plastics. Such short-sighted opportunism can and will be properly controlled when those architects, engineers and builders concerned with these new material applications have access to articles such as yours.

Many thanks for the service you are rendering the industry.

Sincerely yours,
Robert G. Dudley
President
Dudley Industrial Corp.
Santa Clara, Calif.

editorial

I hold every man a debtor to his profession; from which as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto. — *Sir Francis Bacon*

EVERY MAN A DEBTOR: this quotation is cited as the credo of the registered professional engineer by the National Society of Professional Engineers and the allied consulting engineering societies.

Engineering today is far from static—for it is essentially a creative profession. It has played a dominant role in building American industrial superiority, in developing the principle of mass production and in giving the American people their standard of living. In the same manner, the profession of the consulting engineer is making a vital contribution to the national scene—both materially and culturally.

Consulting engineering is a big profession—if we may use the word in its richest sense—a responsible profession and a rapidly growing one—by leaps and bounds. In private practice, there are three firms of consulting engineers today where there were two just five years ago. One-third of the firms are less than five years old. Two-thirds are less than ten years old. Reliable surveys indicate a continuous expansion of consulting engineering activity.

Consulting engineering is one of the nation's most vital and responsible professions. It places ethical and performance demands upon the engineer that are similar to those of the architect, the doctor, the lawyer and the educator. Consulting engineers will be found designing the structural features of buildings, bridges, highways, dams, water supply systems, sewage disposal plants, heating, ventilating, air conditioning, refrigeration and electrical systems. They engage in the study of soils and rock formations serving as foundations as well as the many other problem areas in the development of plans for various structures.

A competent practitioner must not only know his specialization but he must be familiar with correlative engineering problems. His work brings him into contact with other allied professionals, investors, contractors and representatives of the mechanical trades. He undertakes a personal, legally-undelegated responsibility for human safety and the disbursement of economic and material forces for property valued quite often at millions of dollars. Accordingly, the public welfare and the lives of many people depend upon his intelligence and the accuracy and disposition of his judgement.

He is not a slave to his slide-rule, unaware of reality or the meaning of his work within human environment. He will also be found to be a man equally conversant with Faulkner, Picasso and Beethoven as he is with steel or concrete. He is a cultured man—a responsible citizen in his community and in his profession.

Just as it is imperative for any owner who commissions a building to retain the services of a competent architect, it is now becoming increasingly essential that a consulting engineer be retained either through the architect, or directly to associate with the architect, from the building's inception to its conclusion. The consulting engineer, whether an individual or a firm of engineers, is best qualified through his training and experience to design and supervise all phases of engineering problems together with the architect, for efficient solutions. With construction costs high and the technology of building becoming increasingly complex, it is more important than ever to plan carefully and wisely.

Like their colleagues in architecture, consulting engineers are registered engineers in private practice who work for and together with architects in performing a disinterested, ethical service, free of any manufacturing, contracting or sales connections. They may be selected from membership of the consulting engineers associations located in every state and large metropolitan area. Recommendations by their associations assure prospective clients, whether architects or owners, of high standards in performance and ethical practice.

All success and to the future! *JJC*

LIGHT FOR LIVING

*by Henry L. Logan, Fellow, AIEE and IES**

the human race literally depends upon light for its continued survival. Environmental influences, have shaped our theories of natural and artificial lighting. A world-renowned authority discusses aspects of this vital problem.

The role of vision in human life is to gain information about the external world needed for the safety, health and activities of people. This information is reported to the individual in the form of visual signals (luminous radiation), that are transformed within the person into pulsations on the nerve extensions of the light-responsive retinal elements (rods and cones). These are the two types of light receptors in human eyes. (*Figure 1.*) The tiny spot in the central region of the retina called the fovea, is completely packed with cones. We *see* with the fovea. Man has a *line of sight* which must connect the object of regard with the fovea through the lens. He only sees *clearly* along his line of sight.

Away from the fovea, the rods begin to appear and quickly become more numerous. Throughout the entire eye they outnumber the cones twenty to one. Their tie-in with the motor system of the body is therefore dominant in the operation of the *objective orientation reflex.*

Orientation reflex

Objective orientation for the individual is awareness of position and rate of movement with respect to *other* objects. It is largely a function of vision. Vision cannot operate without light; and safe, successful objective orientation in a physiologically normal person is *principally a matter of proper lighting.*

There is another way to state this: the cause of failures in normal people to avoid hazards that operate more slowly than the orientation reflex, *may lie in faulty lighting.* When it does, the accident arises from visual clues that are inadequate to trigger the involuntary orientation reflex; or from misleading visual clues that trigger a defective involuntary response. Accidents which occur, within our sense range are those events that are detected by the senses and operate more slowly than the rates of perception and involuntary response of the individual concerned. Falls, falling objects colliding with stationary objects and contact with moving machinery are some examples of accident-causes in this area of visual orientation. The mechanics of the functioning of the eyes and the correlative response of the motor system are rather complex. Therefore, a discussion of this phase of vision would be too lengthy for the purpose of this article. What is to be indicated is the scope of the functions of our visual senses and their relationship to lighting practice.

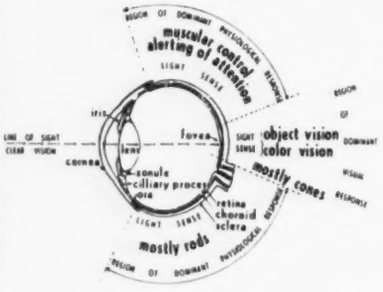
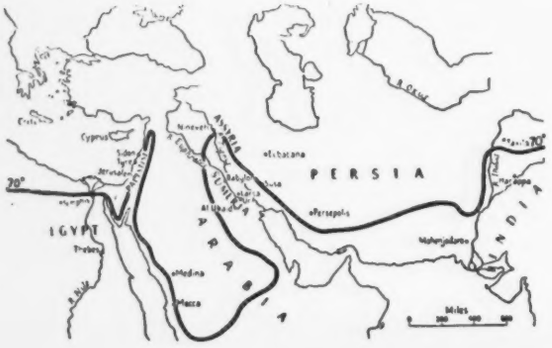


Figure 1. (right) Section through the human eye, illustrating areas of dominant visual and dominant physiological response. Figure 2. (below) The 70° isotherm and the sites of ancient civilization. For simplification, the isotherm is shown as a line, but it is rather a succession of areas.



Development of criteria

Criteria for good interior lighting is derived from a study of the distribution of light in natural fields of view. The study of light is treated, in terms of man's adaptation, as one of the environmental stimuli related to other stimuli of heat, moisture, air movement, sound, etc. Therefore, criteria are stated in terms of *optimum conditions for an optimum environment.*

Laboratory work has been going on for decades. However, for all the mass of detailed examinations and data produced to date relative to improving artificial lighting practice, the emphasis has been on "light for seeing" as a performance standard. The author's contention is that investigation into illuminating engineering problems must be in terms of *"light for living"* —a recognition that the human race literally *depends upon light for its continued survival.* The natural luminous environment to which man has been adapted for countless centuries contains the clue to desirable lighting practice.

Research has disclosed that for safety, man has depended closely upon his degree of adaptation to the *prevailing stimulus pattern of the total field of view.* Therefore, a closer examination of total natural stimulus patterns is in order.

Optimum stimulus patterns

Inevitably, the questions raised in any investigations were: *(1) in what natural conditions were the optimum stimulus patterns to be found? (2) what natural conditions are best for man?*

From Herodotus to the present day, these questions have been the subject of observers in this field. Findings in recent years have lead to a new, wider and more rigorous examination of natural lighting conditions *in an attempt to determine the luminous "dimension" of the optimum climate of man.*

S. F. Markham, in *Climate and the Energy of Nations* states that there is no *specific* optimum, but there is an *optimum range* which covers temperatures, humidities and so forth, suitable for man in all that great variety of states from profound slumber to extreme physical exertion. Man may be the highest product of the animal kingdom, the most intelligent and a superb triumph of evolution, but his control of body temperature is feeble compared to that of many animals. Many animals can suffer a change of ten degrees in their body temperature without inconvenience, but man must keep his body temperature near 98.6°F or die.

This critical interior temperature of man appears to be the central phenomenon controlling man's development on this planet—and dictating the location of his origin.

* *A registered professional engineer, Mr. Logan is distinguished by a career of service as a Fellow of both the AIEE and the IES; Member of the National Board of Examiners of the AIEE; U.S. Delegate to International Commission on Illumination, Zurich Congress, 1955 and Brussels Congress, 1959. Speaker by invitation at the British Illuminating Engineering Society Bi-Annual Conference, 1953, he has given over 900 lectures in addition to many papers on the science of illumination and its application. Mr. Logan is Vice-President in Charge of Research of the Holophane Co., Inc., New York City.*

Man is still most closely adapted to the climate of his place of origin and he tries to carry that climate with him *by means of his inventions*, wherever he goes. The entire history of shelter engineering reveals an unremitting effort by mankind to provide itself with an indoor climate that would reproduce as nearly as possible the climate to which man is best adapted, *i.e., the climate of his place of origin.*

All available researches on this subject were examined and correlated by S. F. Markham who reported that the 70°F annual isotherm is the probable location of man's original habitat. (*Figure 2.*)

Role of the eyes

The propositions that grew out of the preceding considerations of evolutionary, physiological and climatological references may be summarized as follows:

(1) Human eyes have a dual function: the primary function being the exercise of motor control, through the peripheral stimulus patterns striking the rods, for the purpose of enabling man to successfully run the daily gauntlet of environmental hazards; the secondary function being the exercise of sight-sense for seeing detail and color, by means of which man has developed the organized, cultural activities of civilization.

(2) Human eyes are adapted to the specific natural environment that surrounds man as he moves upright on the ground at the base of an ocean of sky, across which moves one principal light source, the sun: and—

(3) This specific natural environment is the one characteristic of the normal climatic conditions associated with the 70°F annual isotherm —where it passes over land masses.

Artificial lighting and eyes

A logical consequence of the points given above is that artificial lighting should be designed *with the needs of the total eye in view,* instead of to meet primarily the requirements of the cones, which are only 5 per cent of the light-responsive cells of the eye: and, that the specifications of this lighting should be drawn, if possible, from the luminous conditions characteristic of the features of the special natural environment to which man is adapted.

Therefore, as man's physiological responses to temperature, humidity, air pressure, air movement and solar radiation fit so closely, the climatic conditions characteristic of the 70°F annual isotherm; and as these particular weather conditions determine the accompanying luminous conditions, the writer has undertaken investigation of the total field of view under conditions of the 70°F isotherm.

If space permitted, the method of investigation would be described. Essentially, the tests made were in reference to the combined influence of temperature, humidity and air movement on

(*Continued next page*)

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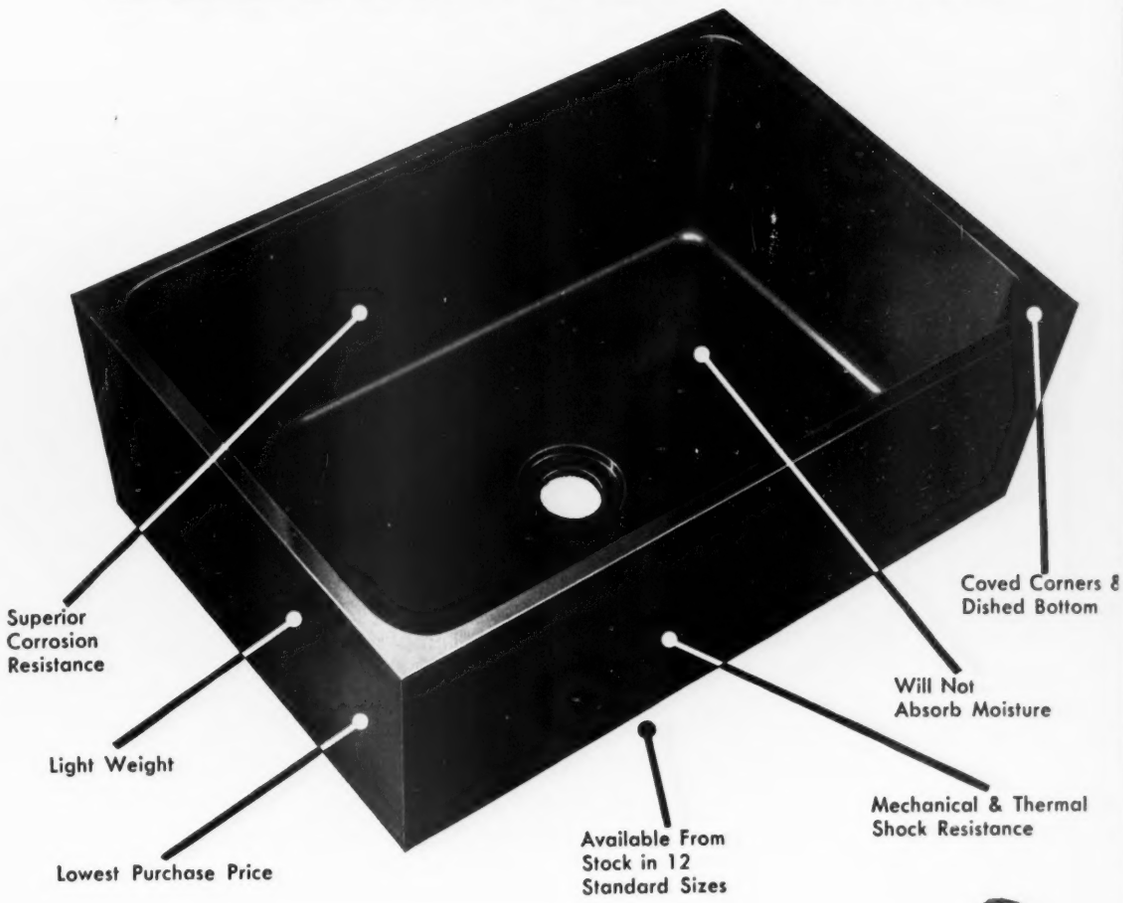
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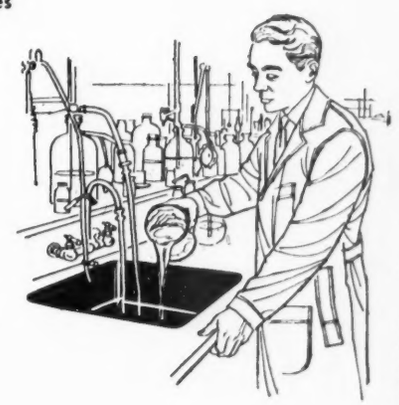

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LIGHT FOR LIVING

(*Continued from page 13*)

visual comfort. The tests measured the adaptability of the subjects to various fields of view—i.e., under those conditions under which the subject would "look hard" (stare) or "squint," etc.

The field conditions were transferred and applied to controlled indoor environmental lighting conditions.

As long as it costs money to provide lighting for man's indoor activities and for outdoor night activities, it has been desirable to develop application techniques that will reveal the maximum relevant information existing in a given field of view, at the least expense. It should be borne in mind that the "maximum relevant information" to which reference has been made, includes not only that needed by the observer to operate his consciously directed activities, but also that which is needed to establish emotional states, such as comfort, ease, security and aesthetic response.

Recovering information

There is no way at present of determining the total relevant information that is potentially recoverable in a given field of view and comparing it with the percentage that can be recovered under various lighting conditions, but partial solutions are available.

For example, general experience demonstrates that with more light, more can be seen; either because details can be recognized, or motion in peripheral zones more quickly detected. The change of speed in seeing with increased light is shown in *figure 3*.

More can also be seen with better contrasts. This is illustrated in *figure 4* where the white beads are almost invisible against the white background but clear against the black.

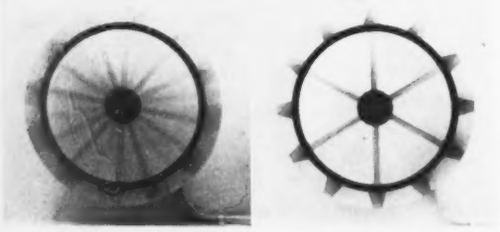


Figure 3. Change in apparent speed of a rotating wheel under low and high lighting levels. Wheel appears to rotate fast under low light (left) and seems to slow up considerably when lighting level is raised, (right).

Quantity factors

Factors used in connection with "quantity" of light are time, size, contrast, and the condition of the observer. At present, although lighting engineers are aware that pre-exposure states may influence the response of an observer to a visual field, and that many people have eye defects, they ignore pre-exposure states for obvious reasons and confine themselves to acting on the assumption that the people who will use the lighting systems they design either have no visual defects, or that their defects have been corrected

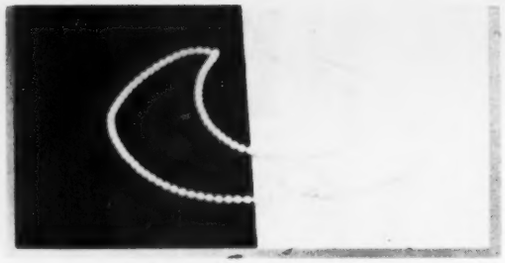


Figure 4. Contrast with background: white beads on a dark background need less light than on a light surface.

to normal.

In order to determine scientifically the illumination level required for a given visual task, it is necessary to know the size of detail that is characteristic of the visual task, as well as its contrast with the background.

Although the presence of light is essential to permit an observer to receive visual information from a field of view, the quantity of light, all other things being equal, will determine the rate at which we can see—quantity is not enough. There is plenty of light in a fog on a snow field in the daytime, but the only information the observer can get about the field of view is the presence of light. In order to get more information from the field of view, there must be both qualitative and quantitative contrasts. There must be differences in the amount of light in various parts of the field of view and differences in color.

Thus a given quantity of light and the precise distribution of that light will determine both the kinds of categories and the quantity of information in each category that can be recovered from a field of view. "Bland" fields of view with low contrasts will convey *less information* than "sculptured" fields with wide contrasts; but there is a top limit to the desirable contrasts.

Utilizing responses

Inasmuch as we are natural creatures, the basic assumption is that the range of distribution of natural lighting associated with the narrow band of climatic conditions that are optimal for human beings is desirable to follow.

Any interference with the kind of information needed from a field of view, or with the quantity needed, or with the rate at which it can be received disturbs the observer. Insufficient light shows up as fatigue, resulting from tensions caused by the slowing up of perception and the muscular effort required to bring objects close to the eyes for the recognition of detail. Non-revealing shadows cause a sense of insecurity or frustration. Absense of shadows shows up as errors in space-time judgements, and as enervation of the nervous system caused by the lack of interest in "bland" environments. Glare shows up as visual discomfort.

Visual comfort tables are now available as a guide to current types of lighting that are least likely to cause annoyance as a consequence of continued exposure to them.

Diffused light

Lighting fields of view by highly diffused light not only may interfere with best seeing by sending too large a proportion of the light directly to the eyes from the lighting equipment, but also may interfere with the receipt of information from the field in other ways.

For example, the shapes of the three objects in *figure 5* are difficult, if not impossible, to assess accurately, as a result of the bathing of these objects by diffused light. The same objects, lighted by controlled light in which much of the randomly directed light is prevented, are easy to recognize in *figure 6*.

Figure 5. Three objects (left) shown under diffused light which conceals form. Figure 6. Three objects shown (right) under controlled light which reveals form.

The degree of diffusion in the light has an important relation to one of the aspects of reflected glare. Reflected glare presents a different and more subtle problem than direct glare. There is a fairly satisfactory yardstick of measurement for direct glare, but nothing comparable for the pinning down of the effect of reflected glare. Reflected glare has two aspects. The most important, and least realized is illustrated in *figure 7*.

Figure 7. Demonstration of the effects of "dimage." Left portion shows that more visual information may be recovered from a less diffused surface.

This effect is called "dimage" and is the reduction in contrast caused by veiling glare. It reduces visibility, but because it may occur over wide areas, it may not be obvious and often escapes detection. It is clearly visible in the illustration, as a portion of the newspaper was shielded in order to prevent dimage on the left part, permitting a comparison to be made. The experimental setup shown was designed to bring out the effect sharply, so that the effect in the illustration is greater than usually will be encountered in actual installations.

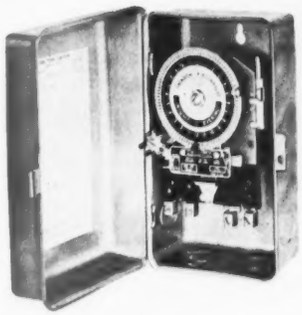
In general, the higher the percentage of diffusion in the light, the greater the degree of dimage to be expected. The degree of diffusion in light is an important factor in the kind of use the eye can make of light.

The anatomical structure of people is no protection against the flat angle light of low sun

(*Continued on page 38*)

products, equipment, materials

A/E NEWS offers editorial coverage of recent developments by industry. Inquiry cards for further information face pages 8 and 32.



Time switch

MFR'S DESCRIPTION: formerly available only on special order, the two-circuit time switch, Model 1196, for switching heavy loads is now listed in the standard line of Tork Time Controls, Inc.

USES: automatic lighting control in apartment houses, parking lot lighting, and other building and industrial lighting.

SPECS/FEATURES: contains two sets of single-pole, single throw contacts. Unit will turn two lighting circuits on at one time and turn them off independently. Available with a choice of dial controls, to meet specific conditions.

AIA file no. 31-D-49

MFR: TORK TIME CONTROLS, INC.

Circle 1 for further information

Clusters in lamps

MFR'S DESCRIPTION: a variation of the George Nelson designed "bubble" lamps has been introduced by the Howard Miller Clock Co.

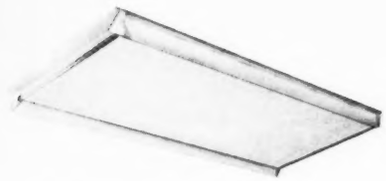
USES: interior decorative lighting.

SPECS/FEATURES: both round and elliptical styles now available in clusters—from two to six bubbles hanging from one fixture. These groups of bubbles, which can hang at the same level or at varying lengths, provide greater decorative emphasis and increased light for larger areas. Bubbles are fashioned in lightweight steel and a translucent white plastic. Canopy support is finished in white, chrome or brass, marked with decorative spheres in birch or walnut. Approximate retail prices range from $50 to $90.

AIA file no. 31-F-23

MFR: HOWARD MILLER CLOCK CO.

Circle 2 for further information



Surface mounted unit

MFR'S DESCRIPTION: the "Sculpturama Visionaire" has been introduced by Sunbeam Lighting Co.

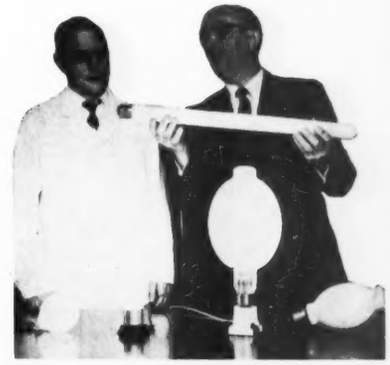
USES: commercial and institutional lighting.

SPECS/FEATURES: unit utilizes gently curved, low-brightness, illuminated metal side panels in combination with a proprietary plastic lens. Designed, according to the mfr, to create a lighting fixture which fuses functional uses with aesthetic qualities. Available for two or four rapid start lamp operation. Continuous row installation is achieved with use of space connector for each fixture, thereby providing convenient wireway. More data available.

AIA file no. 31-F-23

MFR: SUNBEAM LIGHTING CO.

Circle 3 for further information



Unusual fluorescent

MFR'S DESCRIPTION: a fluorescent lamp which requires no external ballast or starter and which can be burned in an ordinary light socket has been developed by the research scientists of the Westinghouse lamp division.

USES: decorative lighting in commercial interiors and related uses.

SPECS/FEATURES: designed to replace use of large external ballasts, some weighing from 2/3 lb. to 25 lbs., in use today and also eliminate starter. This "self-ballasted" lamp permits fluorescent lamp to be screwed into an ordinary light socket. Contains a built-in bi-metal starting switch similar to currently used fluorescent starter. Unit also contains incandescent filament which eliminates need for large external inductor ballast. Other advantages stressed: (1) incandescent filament emits light, thereby adding to unit's total lumen output; (2) color of light produced by tungsten filament serves as color-improving factor because red end of spectrum common to incandescents augments normal blue-green end of color spectrum common to fluorescent phosphors; and

products, equipment, materials

(3) unit can be made in conventional double-ended variety or with socket at one end. Further technical information available. Picture shows Dr. Rolland M. Zabel (right) and Westinghouse research scientist Daniel A. Larsen who spearheaded the development of lamp.

AIA file no. 31-F-21

MFR: WESTINGHOUSE ELECTRIC CORP.

Circle 4 for further information

Tubeless fluorescent

MFR'S DESCRIPTION: a new concept in fluorescent lighting has been unveiled by scientists of the Westinghouse lamp division.

USES: source of illumination.

SPECS/FEATURES: fluorescent lighting has long been conceived in terms of a tube, or line sources of light; the Westinghouse scientists are producing large, thin, rectangular glass plates no more than an inch thick, which produce fluorescent light. The unusual lamps consist of a labyrinth or maze of passages sealed in a thin glass block. The arc or electric discharge travels this winding path through the glass block to produce, in effect, a large area source of light. Experimental models are being produced in various sizes: 24" x 8" wide x 1" thick, and 12" square by 1" thick. The flat fluorescent panels could find a myriad of commercial applications limited only by the imagination of the architect or lighting designer. Supplementary engineering information available.

AIA file no. 31-F-2

MFR: WESTINGHOUSE ELECTRIC CORP.

Circle 5 for further information

Double resistor lamp

MFR'S DESCRIPTION: a double-resistor, double electrode mercury vapor lamp, the "Arc-Ray," has been introduced by Duro-Test Corp.

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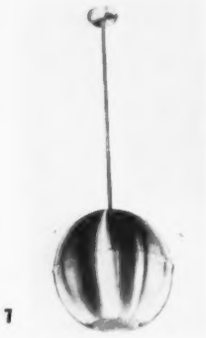

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USES: lamp units.

SPECS/FEATURES: provided with fully operative main and starting electrodes, lamps are claimed to start under worst possible conditions, including temperatures of 20 below zero and are also stated to maintain higher lumen output throughout the 12,000 hour lamp life. Has 400 watt rating and is available in two series: 9,000 hour lamp, in clear and color-corrected models, and 7,000 hour unit, in clear only. Units are available at competitive prices.

AIA file no. 31-F-22

MFR: DURO-TEST CORP.

Circle 6 for further information

Custom loudspeaker

MFR'S DESCRIPTION: for sound installation where custom-designed loudspeaker baffles, similar to the spherical suspended baffle shown, prove desirable, Soundolier, Inc. has inaugurated a Special Baffle department.

USES: service to accommodate special architectural treatments in loudspeaker design.

SPECS/FEATURES: many specific installations require changes in a standard baffle or new design concepts not found in standard lines. Mfr's facilities provide for redesign and manufacture of special baffles at low cost and standard delivery schedules. Line includes series of wide angle baffles, recessed, surface, suspension wall or ceiling installations for unusual architectural treatments. Other types are spherical suspension baffles, acousti-louvered trim rings, trim squares, and baffles louvered to match air diffusers. Other series cover range of acoustical tile models, various offset, controlled directional and bi-directional baffles.

AIA file no. 39-B-1

MFR: SOUNDOLIER, INC.

Circle 7 for further information

Two new concepts

MFR'S DESCRIPTION: two new concepts in fluorescent lamp design were revealed recently by engineers of the Westinghouse lamp division.

USES: decorative applications or unusual effects in commercial projects.

SPECS/FEATURES: fluorescent lamp has traditionally been tube with a base at each end for electrical contact; Westinghouse has unveiled a fluorescent tube with a base on just one end. Single-ended lamp can be connected to one socket like conventional incandescent light bulb. Second unusual change in lamp design is the U-shaped lamp. It is stated to have many advantages since all electrical wiring is confined to one end of the fixture. U-shaped fluorescent lamps have efficiency equal to or greater than conventional lamps. Also a U-shaped lamp of 75 watts has only one-half the over-all length of a standard 75 watt lamp. Westinghouse currently is working with various architects and engineers to determine scope of applications.

AIA file no. 31-F-23

MFR: WESTINGHOUSE ELECTRIC CORP.

Circle 8 for further information

Remote control banking

MFR'S DESCRIPTION: a remote control drive-up banking system utilizing curbside kiosks called "Snorkles" is announced by the Mosler Safe Co.

USES: curb-side teller devices.

SPECS/FEATURES: curbside kiosks connected to bank windows by a horizontal underground conveyor belt system. Devices provide a method of drive-in service for financial institutions lacking adjacent parking space or hindered by zoning laws which prohibit extending building structures to the curb. The "Snorkle" is the size of a large TV set. Motorists and tellers are in direct line of vision.

Deposit slips, cash, checks and other items are carried between teller and customer by a tray-like container reached by means of a door in each kiosk. Tray is whisked underground and makes ro nd trip in 6 seconds. Teller is able to carry on conversation with motorist-depositer by means of two-way speaker system. Units are also equipped with periscope mirrors where teller is stationed below sidewalk and with two-way closed circuit TV systems, teller-customer communications may be conducted up to half a mile.

AIA file no. 35-S
MFR: MOSLER SAFE CO.
Circle 9 for further information

Folding bleachers

MFR'S DESCRIPTION: the "Deluxe EZ-A-WAY," a proprietary system of folding bleacher units which offer individual seat delineation and color selections for harmonizing with gym interiors, is announced by the Berlin Seating Engineers.

USES: gymnasium spectator seating.

SPECS/FEATURES: individual seat delineation which may use alternate seat colors. Foam rubber seat and back rest pads covered with desired vinyl fabric backed covering. Seat numbers on back rest. Replacement by individual units. Spacing: 18" per seat at 28", 30" or 32" back-to-back. Mfr recommends 30" or 32".

AIA file no. 35-F-11
MFR: BERLIN SEATING ENGINEERS
Circle 10 for further information

Calendered tile

MFR'S DESCRIPTION: a smooth, washable, calendered finish acoustical tile is announced by Simpson Logging Co.

USES: residential and commercial construction.

SPECS/FEATURES: random pattern acoustical tile has three sizes of perforations for aesthetic appearance as well as acoustical efficiency. Tongue and groove joint detail for assembly. The T&G edges have extended flange for concealed nailing or stapling. Tiles, of wood fiber content, available in 12" x 24" center score to simulate 12" x 12" tiles. Smooth finish is obtained by calendering process which "irons" the painted finish between heated rollers until it is smooth as paper. Repainting will not impair noise control efficiency. Factory finish is white, with excellent light reflection without glare, according to mfr.

AIA file no. 39-B
MFR: SIMPSON LOGGING CO.
Circle 11 for further information

New size ceiling tile

MFR'S DESCRIPTION: Celotex Corp. is now distributing its perforated mineral fiber acoustical ceiling tile in a 24" by 24" "economy size."

USES: ceiling acoustical treatment.

SPECS/FEATURES: rated as incombustible; available in random perforation pattern as well as standard perforation pattern. This 24" x 24" size brings to three the number of sizes of this product: the others being 12" x 12" and 12" x 24". Economy in use is stressed in terms of unit coverage afforded by larger size. Reduction of number of sections required in the ceiling suspension grid system is another advantage, according to Celotex officials. Produced with a bevel edge, kerfed for application on concealed ceiling suspension systems, or with edges trimmed, without bevel or kerf, for applications on exposed ceiling suspension grid systems. Available with center grooving to simulate smaller tile sizes. Repainting or stenciling does not impair sound absorption. Finished in washable white surface, tile is maintained by wallpaper cleaner or chemically treated sponge.

AIA file no. 39-B
MFR: THE CELOTEX CORP.
Circle 12 for further information

Experimental window

MFR'S DESCRIPTION: an experimental window, billed as the "Window of the Future" and designed to "outsmart" the weather electronically has been under study by the Truscon Div., Republic Steel.

USES: prototype for future windows.

SPECS/FEATURES: window not commercially available. Experimental model window (resembling awning window) closes automatically when: (1) temperature inside house gets below a pre-determined setting; (2) it rains or snows; or (3) a strong wind blows against it. Reaction to elements is determined by photoelectric cells below exterior face of sill. When rain or snow contacts controls, a circuit is closed and electronic relays actuate an electric motor causing window to operate. In an upper panel, a tiny mechanical flapper reacts to winds over a certain velocity. The flapper completes a circuit, thereby actuating window's closing by an electric motor. Window serves as own storm

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Circle 135 for further information

window. Each vent consists of two panes of vacuum sealed glass. Assembly consists of three movable, adjustable vents which project out horizontally and simultaneously. Each time window opens up, a screen automatically rises from under sill. When closed, screens backs down into its housing. Controls inside window frame permit manual and automatic operation. Vents may be directed to any desired position. Window's automatic shade can be brought up to any required height for light control. Washing is accomplished with vents closed and washed from interior as one pane of glass. To wash exterior face, vents are reversed electrically and brought to interior position for repeat of process. Further engineering information available.

AIA file no. 16-L

MFR: TRUSCON DIV., REPUBLIC STEEL

Circle 13 for further information

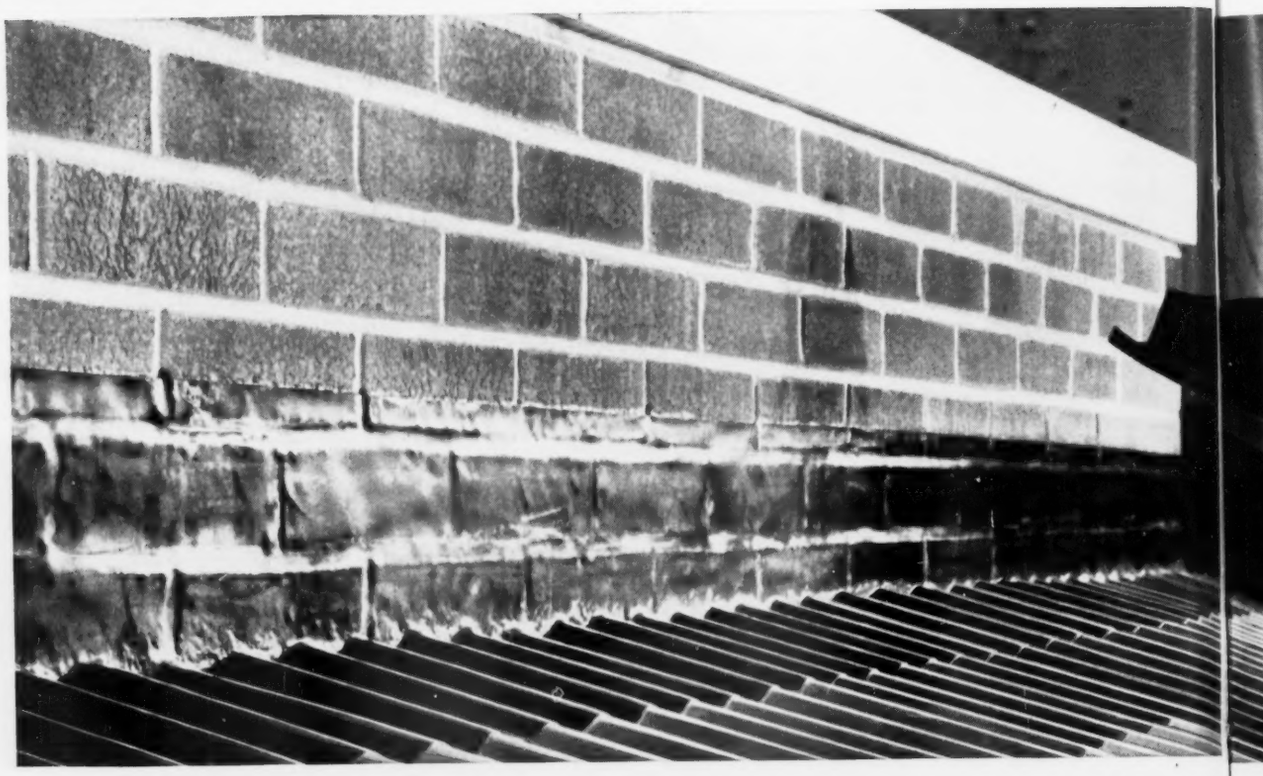
Square glazed wall tile

MFR'S DESCRIPTION: Romany-Spartan has introduced the "Level-set," a 4¼" square glazed ceramic wall tile, designed to maintain exact control of size and squareness.

USES: ceramic faced interior walls.

SPECS/FEATURES: new tile is claimed as the "world's only precisely sized 4¼" square glazed ceramic wall tile." Emphasis is placed on redesigned body, ground on all four edges and uniform size of product permitting it to stack plumb and true for perfect joint alignment. Nondirectional bonding rib design eliminates sag in setting, states mfr, and ground edges eliminate glaze flecks and create uniform grout curing. Range of colors available with matching ground-edge bullnose and cover and full complement of angles. Available also in 12¾" x 25½" treated

DOW | BUILDING PRODUCTS



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Dow's new elastic flashing provides on-the-job fabrication to fit any contour. Even where expansion and contraction would soon destroy the effectiveness of ordinary flashing, Saraloy 400 does the job for years. It offers substantially longer service due to its elasticity and weathering resistance.

Saraloy 400 is a thermoplastic sheet flashing material which is easily bonded to concrete, metal, wood, masonry, glass-reinforced plastics and built-up roof materials. It is self-sealing around nails driven through it. Saraloy 400 is waterproof and weatherproof . . . won't crack, corrode, check or peel. It can be painted, if desired. It's priced competitively and its longer life means less maintenance and lower cost per year of service.

ROOFMATE*

New insulation board for built-up roofs bars moisture, cuts costs.

Roofmate, Dow's new built-up roof insulation, reaches a new high in durability and ease of application. It is composed of a core of polystyrene foam enclosed in an asphalt laminated kraft wrapper. Millions of tiny air cells provide a low heat transmission rate and excellent resistance to water and water vapor. Because it stays dry, Roofmate keeps its insulation effectiveness longer and helps to prevent damaging bubbles and cracks in the roof membrane.

Designed for normal hot roofing application, Roofmate requires no special equipment or skills. It's easy to cut and fit around vent stacks and other obstructions. It's lightweight—easy to handle—goes down more quickly with less fuss. Make your own quality comparison between Roofmate and other insulations. You'll find it costs no more to specify the best.

For more information, write to THE DOW CHEMICAL COMPANY, Midland, Mich., Plastics Sales Dept. 1610JF5.

*TRADEMARK OF THE DOW CHEMICAL COMPANY

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

Circle 137 for further information

products, equipment, materials

paper-back sheets. Prices cited as competitive.

AIA file no. 23-A

MFRS: UNITED STATES CERAMIC TILE CO. AND THE SPARTA CERAMIC CO.

Circle 14 for further information

Composite board

MFR'S DESCRIPTION: "Lebanex," a composite board material made of laminations of veneer with a hardboard facing on both sides, is announced by Cascades Plywood Corp.

USES: constructions including table tops, sink tops, furniture, cabinets, wardrobe doors, drawer fronts, etc.

SPECS/FEATURES: material available in four grades, in thicknesses from ½" to 1½". Best grade "Lebanex" is made up of top quality, jointed veneer core, overlaid on both sides with "PL90 Lebanite," a special high density hardboard stated to be particularly wear-resistant. Other grades faced with standard "L30 Lebanite" which is also said to have high degree of resistance to heat and abrasion. All grades are suitable for interior or exterior use, as special exterior-type phenolic-resin glue is used throughout the produced line. The material is claimed not to delaminate under subsequent hot-pressing processes. The surface is a dry-process hardboard of homogeneous structure that is suitable for any type of paint or clear finish without leaving "dry" spots. Light colored finish permits tint or pastel coloring of surface.

AIA file no. 19-E-6

MFR: CASCADES PLYWOOD CORP.

Circle 15 for further information

Stainless steel unit

MFR'S DESCRIPTION: the "Steri-Mac" unit is a stainless steel urinal equipped with ultraviolet germicidal units, the pur-

pose of which is to destroy all bacteria, and with the use of ozone units to cleanse and freshen the air. Unit is manufactured by Van Vetter, Inc.

USES: public places such as cocktail lounges, restaurants, hospitals, institutions, schools, service stations, etc.

SPECS/FEATURES: water tube and all exposed parts of 20 gauge, US standard, Type 302 (18-8) stainless steel. Body coved to 5/8" radius, front sanitary edge rolled to 180°. All welding by inert gas shielded method. Finish of rolled edges highlighted to #7 and other exposed surfaces to #4. Units furnished complete with all component parts; lamps, ballast, starters, sump strainer and sump cover, ready for connection to building services. Units may be directly connected to cold water system with key type regulating valve as water inlet is above flood level of fixture. Flush tank or flush valve may be used. Electrical operation at 115 v., 60 cycle, single-phase. Water flow range from 5 gph to 15 gph. Technical data available.

AIA file no. 29-H-2

MFR: VAN VETTER, INC.
Circle 16 for further information

LIGHTING UNITS

Luminous ceiling

MFR'S DESCRIPTION: the "Infinilite" luminous ceiling, designed for an over-all clean, non-modular effect, is announced by Integrated Ceilings, Inc.

USES: suspended ceiling systems.

SPECS/FEATURES: unit not only designed for non-modular effect but it conceals supply air diffusers, music speakers and public address system outlets. Lamps are concealed from direct view at any angle when looking through the plastic grillework. Illustration shows lobby of Texas Co.'s Los Angeles headquarters designed by Architects Welton Becket & Associates.

AIA file no. 31-F-231

MFR: INTEGRATED CEILINGS, INC.
Circle 17 for further information

High bay unit

MFR'S DESCRIPTION: a 24" high bay lighting fixture for use with mercury vapor lamps is announced by Appleton Electric Co.

USES: large industrial interior lighting.

SPECS/FEATURES: fixtures meet National Electric Code Standard for 1,000 watt mercury vapor lamps. Designed with vented hood for lower operating temperatures and minimum dirt accumulation. Electro-chemically processed protective coating for ease of maintenance and to sustain efficiency. Concentrated or spread-type of lighting available. One-piece socket or two-piece types available. Reflectors are Alzak processed aluminum.

AIA file no. 31-F-23

MFR: APPLETON ELECTRIC CO.
Circle 18 for further information

Continuous appearance

MFR'S DESCRIPTION: a commercial lighting fixture, the "Catalina," is introduced and described by the Benjamin Electric Mfg. Co. as a departure from current commercial lighting fixtures in that there are no visible metal frames or braces the full length of the fixture.

USES: commercial applications.

SPECS/FEATURES: when installed in continuous lines, unit gives appearance of being one continuous fixture through use of extruded polystyrene plastic side panels, chemically fused to a 45° x 45° plastic louver to form one unit. Available for two or four lamps in 4′ and 8′ units, fixture has 55 per cent upward light component when suspended; also available with top reflectors for surface mounting.

AIA file no. 31-F-23

MFR: BENJAMIN ELECTRIC MFG. CO.
Circle 19 for further information

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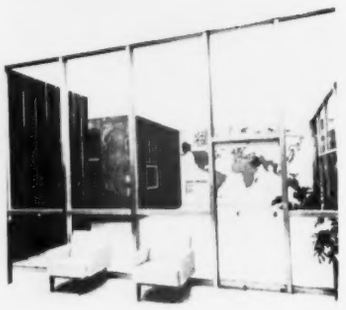

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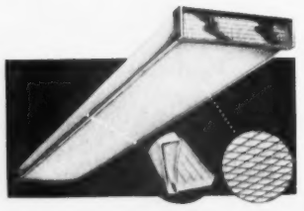

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Illumination system

MFR'S DESCRIPTION: a U-shaped fluorescent fixture known as the "Transolite" is offered by the Transolite Corp. as an innovation in lighting ceiling systems.

USES: commercial and residential projects.

SPECS/FEATURES: U-tube fixture requires no wiring, no spring sockets and only 1′ of metal channel instead of 8′. Made in short sections, they slide onto aluminum I-beam made to accept them. Units connected by nylon locking plugs, thereby eliminating wiring. Socket uses grooved pin lamp bases which snap into sockets for contact. Lamps held by cover of fixture and require no other support. May be used as bare lamp unit, single or strip lighting, or in plain unit for luminous ceilings. Economies of lighting efficiencies and installation utilization stressed by mfr.

AIA file no. 31-F-23

MFR: TRANSOLITE CORP.
Circle 20 for further information

OUTDOOR USES

Floodlighting system

MFR'S DESCRIPTION: specially designed fixtures for architectural illumination are available from Simes Co. based on designs created by Abe Feder to floodlight NYC's Tishman building.

USES: special decorative illumination.

SPECS/FEATURES: cone-shaped reflectors made of polished aluminum each house a 1,000 watt mercury vapor reflector lamp. Fixture equipped with cast aluminum box containing

Circle 137 for further information

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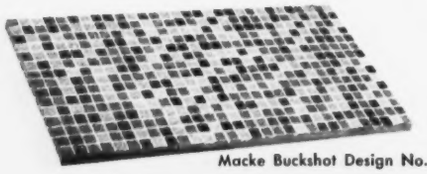

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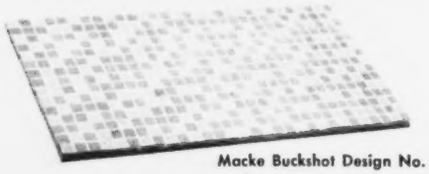
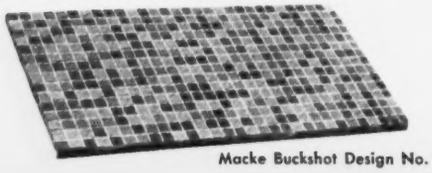


Macke Buckshot Design No. 10



Macke Buckshot Design No. 5

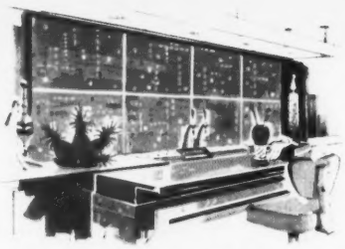
Beautiful beyond words, HORIZON TILE® is a new, American-made glazed ceramic mosaic . . . completely new in character, in shape, in texture and in color. Architects and designers will welcome its many distinctive features and the unlimited design possibilities it offers.

The interesting informality and handcrafted appearance of this unique new ¾" tile is achieved through an intentional variation and irregularity in shape, in surface texture and in color shades.

You can add new interest, new beauty to finished walls by specifying HORIZON TILE® on your next job. It is available *now*, in 58 brilliant to soft pastel colors, solid or textured tones, styled by Faber Birren, noted color authority. Your nearest authorized Suntile Dealer will gladly show you samples. His name is listed in the Yellow Pages of your phone directory.

THE CAMBRIDGE TILE MFG. CO.

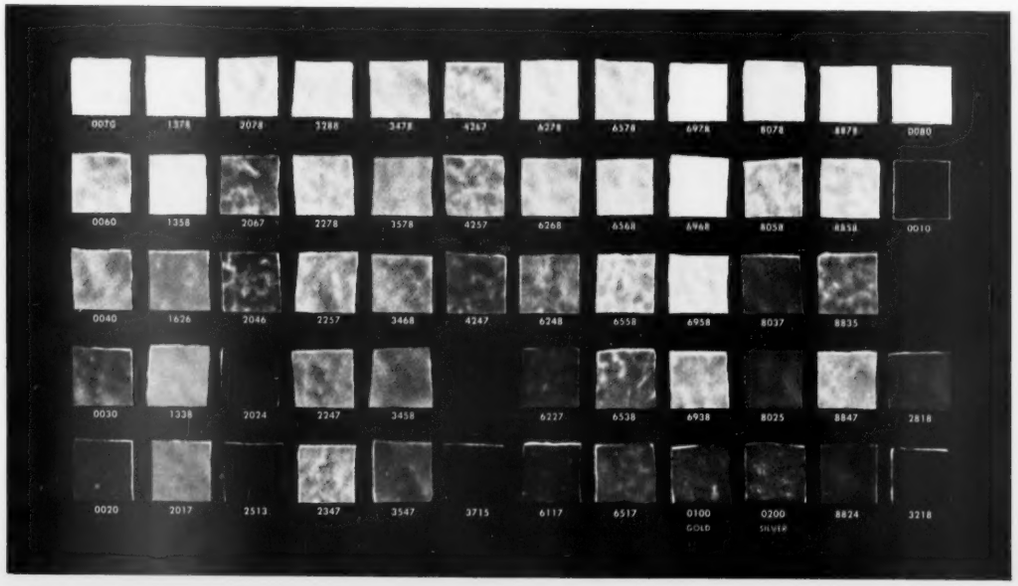
P. O. Box 71, Cincinnati 15, Ohio



TILE*

PRODUCED IN THE U.S.A.

by the makers of Suntile



DESIGNS by HARRY J. MACKE

You can use HORIZON TILE in solid colors, in many original combinations, or select any of 10 buckshot patterns styled by Harry J. Macke. Our Art & Design Department will be glad to assist you with special tile design or layout problems — at no obligation.

COLORS by FABER BIRREN

The beautiful colors of HORIZON TILE were carefully developed by the world famous color authority Faber Birren. Choose from 58 solid or textured colors including gold and silver.

SEND FOR COLOR PALETTE

A color palette of actual tiles showing the complete range of 58 different available colors will be sent without cost to architects and designers who write on their professional letterhead. Others send $1.00. Address Dept. AF93.

24 NEW COPIES FOR ALASKA

In keeping with our policy of reaching every registered architect in the United States, A/E NEWS has added the 24 registered architects in Alaska to our total circulation. 22,675 registered architects and 9,455 top consulting engineers now receive monthly copies of the magazine. This represents the largest audience of architects and consulting engineers ever assembled by a magazine. Advertisers of building products, equipment and materials can effectively reach this top circulation by using space in ARCHITECTURAL & ENGINEERING NEWS. Incidentally, Hawaii is being processed now.

transformer and a yoke for "targetting" reflector. A Pyrex glass lens is fitted with special gaskets to permit bleeding of rainwater and protect interior from weathering. Engineering data available.

AIA file no. 31-F-22

MFR: THE SIMES CO., INC.
Circle 21 for further information

Post top luminaires

MFR'S DESCRIPTION: a series of post top luminaires are offered by Line Material Industries, in five IES light distribution patterns for effective, as well as aesthetic architectural illumination.

USES: public buildings, schools, homes, shopping centers, motels, parks, playgrounds, recreational areas, etc.

SPECS/FEATURES: units may be used with incandescent lamps rated through 10,000 lumens or with mercury vapor lamps rated through 250 watts. Natural aluminum or pastel colored luminaires may be selected with or without aluminum standards of matching colors in lengths of 10′, 14′ or 19′. Mounting diameters of 3″ or 7″ provide means of adapting units to many existing ornamental poles. Installation and maintenance facilitated by low mounting height and hinged reflector.

AIA file no. 31-F-22

MFR: LINE MATERIAL INDUSTRIES, MCGRAW-EDISON CO.
Circle 22 for further information

Aluminum floodlight

MFR'S DESCRIPTION: Appleton Electric Co's #6050 series offers a weather-tight aluminum floodlight.

USES: exterior illumination.

SPECS/FEATURES: selection in beam spreads possible by adjustable dial mechanism for wide range focus in any direction. Cover ring is free-swinging permitting lamp change and service ease. Heat resistant lens, weather-tight construction, water-tight cord gland for lead-in wiring are features stressed. Can be used with mogul base 300 or 500 watt incandescent lamps or mercury vapor lamps.

AIA file no. 31-F-22
MFR: APPLETON ELECTRIC CO.
Circle 23 for further information

Mercury vapor luminaires

MFR'S DESCRIPTION: the Nepo #510-CC mercury luminaire is described by the Nepo Mfg. Co. as a true "tilted" design luminaire with both angular reflector and angular refractor.

USES: street, expressway, shopping center, parking lot illumination.

SPECS/FEATURES: reflector is of Alzak process-finished aluminum fastened at an angle inside the housing to eliminate possible mis-alignment. Refractor is suspended and sealed within the frame by a proprietary gasket arrangement described as "literally floating the glass." This design is stated to protect the refractor glass from breakage due to thermal shock. A constant wattage ballast is incorporated into the one-piece aluminum housing. Ballast primary selections of 100-130/200-260, 240-315/, 200-260/400-520 are possible. Various safety hinge, automatic latching, insulation and photo-electric control features also stressed in the engineering design.

AIA file no. 31-F-28

MFR: NEPO MFG. CO.
Circle 24 for further information

Outdoor floodlights

MFR'S DESCRIPTION: outdoor floodlights designed for locations where concentrated, high intensity lighting is required are announced by Stonco Electric Products Co.

USES: floodlighting of signs, displays, ball fields, recreational or industrial areas, etc.

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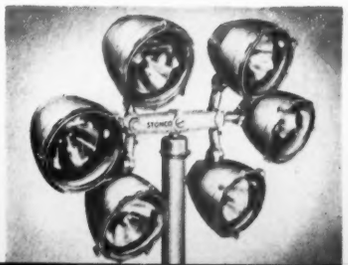

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SPECS/FEATURES: units up to 500 watts can be used singly or in clusters. Lamps are deep-recessed inside compact, one-piece housings designed to reduce annoying glare and provide protection against shock, vibration or the elements. Clear or colored lens kits fully seat units for face-up use in rain or snow. Other features: automatic lamp ejector-spring, pre-aiming quadrant for on-ground pre-focusing, focus lock-in and beam positioner. Advantages stressed: heavy-duty, maintenance freedom, weather and corrosion proof qualities of die-cast aluminum. Units are UL and CSA approved for outdoor service. Engineering information and prices available.

AIA file no. 31-F-22

MFR: STONCO ELECTRIC PRODUCTS CO.
Circle 25 for further information

STRUCTURAL UNITS

Long span deck

MFR'S DESCRIPTION: the "Fentura" system, a long span roof deck, capable of spanning up to 32′ and longer has been developed by Fenestra, Inc.

USES: stated as ideal for school and office-factory construction.

SPECS/FEATURES: salient feature is considered to be its flexibility. Can be left exposed for industrial applications, loading docks, canopies and other similar operations according to mfr. In schools and offices, deck may be finished at any time with lighting troffers for recessed lighting or standard acoustical tiles. Available in 4½″, 6″, and 7½″ depths and 18, 16 and 14 gauges in order to permit spans of 32′ and more for certain roof loads. Longer lengths are provided for overhangs, double span conditions and similar needs. Cold formed in a continuous rolling operation to insure uniformity, material has a tight coat galvanized finish. Basic unit of "Fentura" is Fenestra's LS

Circle 137 for further information on Cambridge Tile

products, equipment, materials

(long span) deck available in three types. Types differ according to distribution of metal and method of top, or compression, flange stiffening to achieve maximum strength with a minimum number of sections. Deck with its top sheet can be adapted for use as a roof diaphragm against adverse lateral forces by seismic or wind forces.

AIA file no. 12-C-2

MFR: FENESTRA, INC.

Circle 26 for further information

Light-gauge roof deck

MFR'S DESCRIPTION: Granco Steel Products Co. is now marketing a light-gauge roof deck designed for economical use in short span construction. The product is known as "Granco Utility Deck".

USES: designed particularly for industrial buildings but may find other applications.

SPECS/FEATURES: "Utility Deck" is specially processed galvanized steel sheet, manufactured in 24 and 26 gauges. Standard lengths are from 7'-2" to 14'-2" in 4" increments. Galvanized coating conforms to ASTM specification for commercial grade coating. May also be used on pre-fabricated buildings as roofing and siding sheets, sandwich type insulated walls or partition panels as either interior or exterior skin. A bonded built-up roof with "Utility Deck" requires a 1" thickness of rigid insulation board.

AIA file no. 12-C-2

MFR: GRANCO STEEL PRODUCTS CO.

Circle 27 for further information

HVAC UNITS

Low pressure valve

MFR'S DESCRIPTION: a low pressure relief valve, the "Thrush # 38" is described by H. A. Thrush Co. as a dependable water relief valve able to cope with steam conditions.

USES: hot water heating specialty.

SPECS/FEATURES: has all brass working parts and a silicone seat designed to be heat resistant and nonsticking. Developed for positive shut off after discharging and its diaphragm gives water corrosion protection to the spring. Has ¾" inlet by ¾" outlet. Has an ASME and National Board Rating of 520,000 BTU. Other value ratings available range from 75 lbs. (1,040,000 BTU) to 150 lbs. (1,940,000 BTU). Descriptive literature available.

AIA file no. 30-C-7

MFR: H. A. THRUSH & CO.

Circle 28 for further information

AC central stations

MFR'S DESCRIPTION: central station air-conditioners including high pressure models and capillary conditioners have been added to current line by the American-Standard Industrial Div.

USES: summer cooling, dehumidifying and winter heating.

SPECS/FEATURES: units factory assembled. Recommended by mfr for static pressures from ¼" to 9" w.g. and deliveries from 800 to 40,000 cfm. Pressures to 3½" are considered low-pressure operation; static pressures from 3¾" to 9" are considered high pressure operation. New to the line is Type C capillary conditioner, a modification of established Type S unit. In this type, sprays act on patented glass-filled capillary cells to produce high saturated air through evaporative cooling. Capillary cell also acts as an extremely efficient air filter for removal of all normal air-borne dust, mold and spore. Features of high pressure units include oversized shaft, heavy duty "Sirocco" fan and well supported heavy duty fan bearings. Fan section completely isolated from coils and accessories of conditioner as well as from duct work by means of flexible connections. Fan section and motor are mounted on either rubber in shear or spring type vibration isolators as required. Complete isolation minimizes effect of sound and vibration transmission into system.

AIA file no. 30-F-2

MFR: AMERICAN-STANDARD INDUSTRIAL DIV.

Circle 29 for further information

Downflow heater

MFR'S DESCRIPTION: the "Downflow" direct fired gas heater announced by the Reznor Mfg. Co. is announced to overcome "problem" heating areas in buildings with high ceilings or obstructions.

USES: construction such as field houses, warehouses, and various manufacturing plants, etc.

SPECS/FEATURES: new equipment designed for installation up to 40' above floor level, and where heat must be pushed down and around obstacles. Direct-fired units available in four basic sizes from 300,000 BTU/hr. Unit consists of duct furnaces with automatic controls, a large propeller-type fan assembly, and screened, bell-mouthed intake boots. Standard specifications include aluminized steel heat exchangers and on-off gas valves with 115 or 230 v controls. Adjustable louvers for air distribution or spot concentration. Optional features: stainless steel heat exchangers and electric ignition, four-way diffuser for hemispherical distribution, and gas modulator.

AIA file no. 30-B-6

MFR: REZNOR MFG. CO.

Circle 30 for further information

Heavy duty fans

MFR'S DESCRIPTION: a series of forward curved mechanical draft fans designed to provide a high air movement to size ratio has been developed by Chicago Blower Corp.

USES: induced draft operations.

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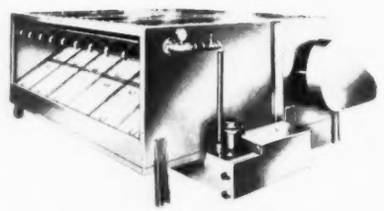

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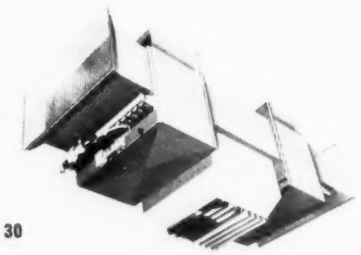

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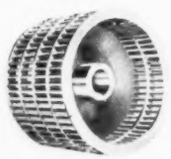

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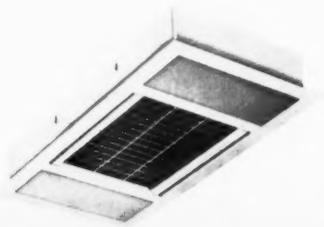

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SPECS/FEATURES: designed for heavy duty through use of large number of forward curved blades for handling large volumes of air or gas within minimum space requirements. All blades formed of mild or alloy steel, depending on duty. Housings are continuous-weld, heavy steel plate, rigidly braced. For quietness, rotors operate at low peripheral speed. Streamline inlets direct air into rotor with minimum of turbulence, and oversized inlet boxes are designed to reduce entering velocity, according to mfr. Automatic or manual controls; 16 wheel diameters and outlet duct sizes vary from 18″ to 77″; two speed ranges.

AIA file no. 30-D-1

MFR: CHICAGO BLOWER CORP.
Circle 31 for further information

Heater/lighting unit

MFR'S DESCRIPTION: the Pyrolite, model RCL, is described by the Berko Electric Mfg. Co. as the first recessed ceiling unit combining electric radiant heating with built-in lighting to be produced.

USES: various commercial and residential applications.

SPECS/FEATURES: unit described to be advantageous for use in rooms where floor-to-ceiling window areas make wall installations impractical. Savings in space and elimination of dual installations are also claimed. Rated at 1,000 watts of heating, unit is mildly fan-forced to circulate convection heat normally stacked at ceiling to all parts of room. Instantaneous, even heat stated to be achieved by use of tempered Pyrex glass panels having a conductive coating. Carbon-contact buss bar used. Units have 200 watts of lighting banked on either side of heating panel. Utilizes wall-mounted thermostat, controlled by separate wall switch. Units UL approved, available in 120 v, 208 v and 240 v capacities. Dimensions are 13¾″ x 27″ outside, 12″ x 26″ x 6¾″ inside.

AIA file no. 30-C-44

MFR: BERKO ELECTRIC MFG. CO.
Circle 32 for further information

ELECTRO-EQUIPMENT

Single case ballast

MFR'S DESCRIPTION: a ballast for PG, VHO and SHO fluorescent lighting stated to be cooler, quieter and nearly seven pounds lighter than present two-section models has been introduced by General Electric.

USES: commercial and industrial applications.

SPECS/FEATURES: designated "6G1200," the single-case ballast for 120 volt operation of two 72″ or 96″ power groove VHP or SHO lamps, has an 18⅝″ mounting dimension and eliminates need for mounting and interconnecting two separate sections. According to mfr, units give reliable starting of 72″ lamps down to minus 20°F and 96″ lamps down to minus 50°F. Other advantages claimed: lower inherent noise level; case temperature is below 90°C when operated in typical two-lamp, surface-mounted industrial fixture without use of auxiliary heat dissipators.

AIA file no. 31-F

MFR: GENERAL ELECTRIC
Circle 33 for further information

Liquid-tight connectors

MFR'S DESCRIPTION: to install the liquid-tight flexible conduit "STN" series connectors originated by the Appleton Century Co. requires only a single wrench action. The units are designed to eliminate lock nuts or "O" rings and give more wiring room inside the wiring box.

USES: to provide positive seal against liquids, fumes or foreign matter in electrical connections.

SPECS/FEATURES: seal formed by patented ferrule which screws into the spiralled steel inner wall of liquid-tight tubing and is compressed into outer neoprene wall. Connector has four parts: compression nut, brass ferrule, connector body, and insulated throat wedge adapter. When screwed into position, continuous metal-to-metal pressure of wedge adapter and connector body against each other and box wall provide resistance to vibration. There is no gasket to deteriorate. Information on wide variety of sizes and uses available.

AIA file no. 31-C-680

MFR: APPLETON ELECTRIC CO.
Circle 34 for further information

Shaded-pole motors

MFR'S DESCRIPTION: integral stator core insulation has been incorporated into General Electric's line of shaded-pole motors for greater efficiency and cool operation.

USES: window fans and portable evaporative coolers.

SPECS/FEATURES: designated "KSP-29," 5″ diameter motors are rated up through ⅛ horsepower and available in both four and six pole models. Designed for use where 100 per cent rain test acceptance is desirable and on portable evaporative coolers subject to operation in moist atmospheres. Laminated electrical stator core structure and insulating material bonded into integral unit. Various advantages of dielectric strength, safety features and flexibility of mounting stressed.

AIA file no. 31-G-29

MFR: GENERAL ELECTRIC
Circle 35 for further information

Junction boxes

MFR'S DESCRIPTION: the Appleton Electric Co.'s "JIC" series is introduced as an addition to its line of liquid-tight, dustproof junction boxes.

USES: as junction or wiring device box, designed to provide protection from liquids, fumes, shavings, dirt or other foreign matter for electrical connections.

SPECS/FEATURES: boxes equipped with either conduit connector or rigid conduit hub. Additional hubs or connectors may be mounted on boxes at desired locations. Safety features provided in elimination of sharp corners and edges, inclusion of captive screws and neoprene gaskets. Factory assembly minimizes installation time and

Fire Hazard Reduced!

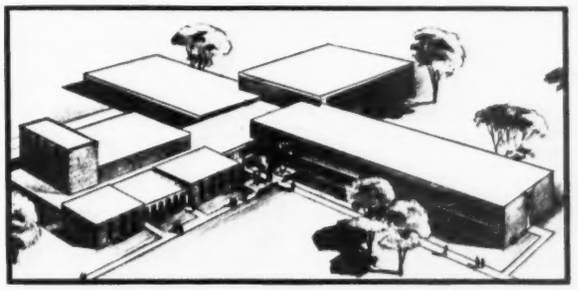
ARCHITECT CHOOSES

Zonolite®

PLASTER FIREPROOFING

for 4 Ohio Schools!

FULTON & DELA MOTTE, ARCHITECTS & ASSOCIATES, CLEVELAND, OHIO



Theodore Roosevelt High School, Kent, Ohio

Beachwood High School Beachwood, Ohio

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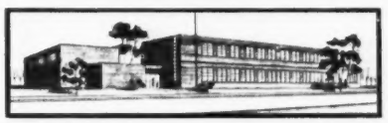

Melridge Elementary School Painesville, Ohio

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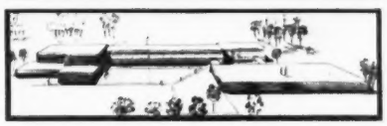

Junior High School Parma, Ohio

Now as never before, this country is acutely aware of the need for maximum fire safety in our schools. That awareness is reflected in specifications of the four Ohio schools above. Walls and ceilings are all of Zonolite vermiculite Plaster.

Zonolite Plaster and Acoustical Plastic systems provide the highest obtainable fire ratings as well as insulating and sound deadening properties. Fire-conscious architects, engineers, and school officials should mail the coupon today for free booklet of facts and figures. No obligation, of course.

MAIL COUPON TODAY

FREE BOOKLET TO ARCHITECTS AND BUILDERS

ZONOLITE COMPANY, Dept. AEN-59
135 S. La Salle St., Chicago 3, Illinois

Please rush me your new booklet on Zonolite Plaster and Acoustical Plastic in modern fire-safe construction.

Name_____

Firm_____

Address_____

City_____ Zone____ State____

Circle 138 for further information

products, equipment, materials

provides positive rigidity. All units have heavy enamel hammertone finish.

AIA file no. 31-C-680

MFR: APPLETON ELECTRIC CO.
Circle 36 for further information

Turret receptacles

MFR'S DESCRIPTION: turret receptacles of cast, satin-finished aluminum have been added to the line of specialized lighting equipment available from Simes Co.

USES: laboratory, offices or plants.

SPECS/FEATURES: device available in a horizontal design 4¾" high and a vertical design 6½" high. Bases for both models measure 4¾" in diameter. Turret can be mounted on floors, tables, desks, or wherever convenience dictates. Attached by threaded base to ¾" or ½" conduit or attached with screws. Supplied with or without three-wire grounding duplex receptacles, 15 amps 125 v., on one or both faces. When one face or turret is used, back face is covered with matching aluminum plate. Instead of receptacles, standard switches can also be mounted in box and switch plates used for its face. Any standard wiring device that fits in conventional box can also be mounted in turret.

AIA file no. 31-F-28

MFR: THE SIMES CO., INC.
Circle 37 for further information

Combination enclosures

MFR'S DESCRIPTION: Crouse-Hinds Co. announces two combination line starter enclosures: "Type DMC" (Dust-Ignition-Proof) and "Type WMC" (Watertight).

USES: operate motor starters and circuit breakers.

SPECS/FEATURES: single speed non-reversing combinations equipped with a universal mounting plate, motor starter reset assembly and circuit breaker operating assembly. Mounting plate fastened to back of body with large knurled and slotted bolt in center of the plate.

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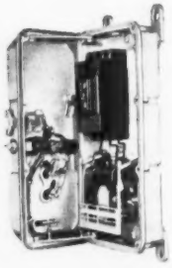

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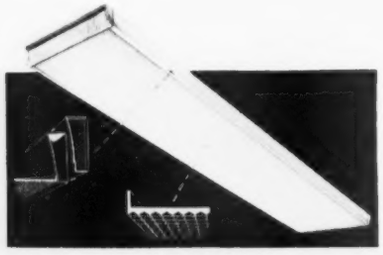

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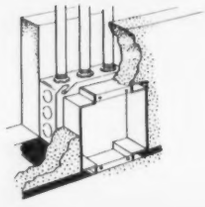

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This facilitates removal of complete plate or starter or circuit breaker individually. Mounting screws supplied with each unit. Built-in pushbutton stations, selector switches with various contact arrangements, pilot lights, and control transformers can be supplied. Other installation detail information available.

AIA file no. 31-D-4

MFR: CROUSE-HINDS CO.
Circle 38 for further information

MISCELLANY

Plastic lens

MFR'S DESCRIPTION: Benjamin Electric Mfg. Co. announces its commercial lighting fixture, the C-2, which incorporates a newly designed plastic lens.

USES: commercial lighting applications.

SPECS/FEATURES: designated as the L-120, the lens is a polystyrene pyramid patterned unit, chemically fused to the extruded polystyrene side panels of the fixture. When installed in continuous runs, the C-2 gives appearance of a single line of light, in that there are no visible metal frames or braces the full length of the unit. Polyethylene plug closes ends of the side panels making them virtually dust-proof and bug-proof according to mfr.

AIA file no. 31-F-23

MFR: BENJAMIN ELECTRIC MFG. CO.
Circle 39 for further information

Glass refractors

MFR'S DESCRIPTION: street lighting refractors of heat resistant Pyrex glass are available from Corning Glass Works.

USES: street and roadway illumination.

SPECS/FEATURES: mfr states that development of the refractors virtually eliminates danger of thermal breakage. Units can be kept small and compact, yet have the strength to withstand the greater heat generated by high wattage lamps of contemporary illumination levels. One refractor, the GE #500, is an incandescent optical assembly of high strength, low expansion borosilicate glass. Refractor is used with lamps up to 620 watt, 10,000 lumen size. Two other refractors for Westinghouse's OV-35 series are being made: one for clear mercury lamps 700 and 1,000 watt sizes; the other for color corrected mercury lamps in the 400, 700 and 1,000 watt sizes.

AIA file no. 31-F-24

MFR: CORNING GLASS WORKS
Circle 40 for further information

Turned-in flanges

MFR'S DESCRIPTION: straight-sided 4" tile covers with turned-in flanges have been added to the RACO line of All-Steel Equipment, Inc.

USES: all types of wall construction.

SPECS/FEATURES: Designed to permit the masonry contractor to saw a tight rectangular opening. Covers available in single and two-device styles for most types of wall construction.

AIA file no. 23-J

MFR: ALL-STEEL EQUIPMENT, INC.
Circle 41 for further information

HVAC slide rule

MFR'S DESCRIPTION: H. H. Robertson Co., manufacturer of the Robertson "Q-Air Floor" system, are offering without charge a slide-rule calculator for computing the temperature of conditioned air going to aerators to maintain 75° F temperature.

USES: office aid.

SPECS/FEATURES: slide-rule is designed to demonstrate conditioning needs for peak summer cooling season and winter heating season.

AIA file no. 35-H-4

MFR: H. H. ROBERTSON CO.
Circle 42 for further information

THE ANATOMY OF A NEW PROJECT

preview:5

NEW PRINCETON QUADRANGLE — *project*
PRINCETON UNIVERSITY — *client*
SHERWOOD, MILLS AND SMITH — *architects*
WERNER-JENSEN & KORST — *structural engineers*
BERNARD F. GREENE — *mechanical/electrical engineer*
ALFRED GEIFFERT, JR. — *landscape architect*

Program factors affecting architects' solution

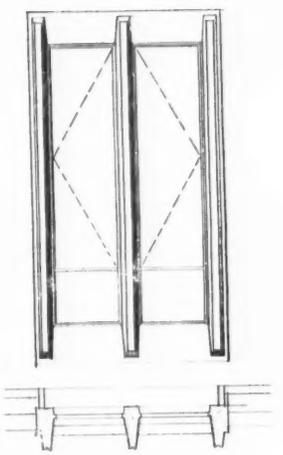
In accepting the design for the new $4 million Quadrangle, the Board of Trustees of Princeton University cast aside stock solutions to dormitory needs.
Instead, the two-century old University, and their architects, Sherwood, Mills & Smith responded with a program tailored to the myriad individual requirements of the institution and its students.

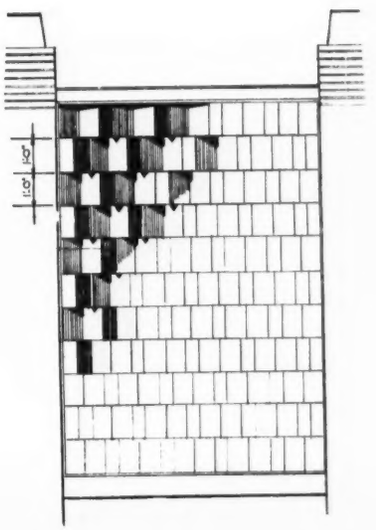
Some two years ago, the University's influential *Alumni Weekly* politely sounded the death knell for the continuance on campus of "period" architecture. What was desired was a "Princetonian" character and not a colonial copy. In an article entitled, "*After Gothic, What,*" the editors stated that the University needed buildings that were "clean and functional."

It was widely felt that under "Gothic Style," students' living accommodations are cramped to fit the style. Carving, limestone trim, and chimneys for rarely used fireplaces involve an expense that could more profitably be used for added space.

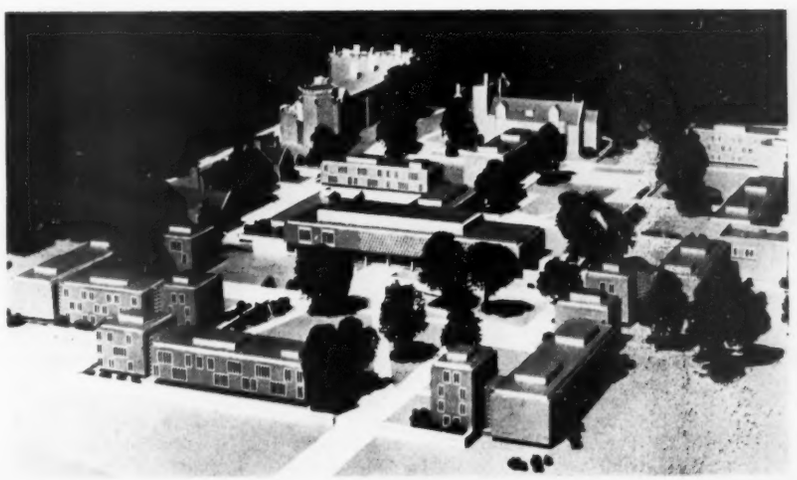
"Ultra-modern" treatments, already in use on certain campuses were studied and subsequently rejected. The consensus was that the "smashing" dramatic effect quickly wears off, and the inhabitants of the building are left with the accompanying shortcomings and discomfort. Some criticisms were that the typically repetitive pattern that appears essential for the exterior aesthetic effect forced a plan solution in which every room must be like every other. The extensive use of glass seemed to place a heavy burden on the students for curtaining, and on the University for heating.

The final design solution which was approved was one which would integrate the character of the existing campus buildings—to the degree of "echoing" or "recalling" its essence without actually matching it. Modern engineering techniques and construction materials are being employed to provide a maximum of living accommodations consistent with reasonable cost.





Top left shows plan and elevation of architects' study for dormitory windows. At right and immediately below is study of grille at stairs which utilizes limestone and glass. Photograph below of the model shows the planning organization of the site and the integration of the new buildings into the existing campus plan.



Other planning criteria

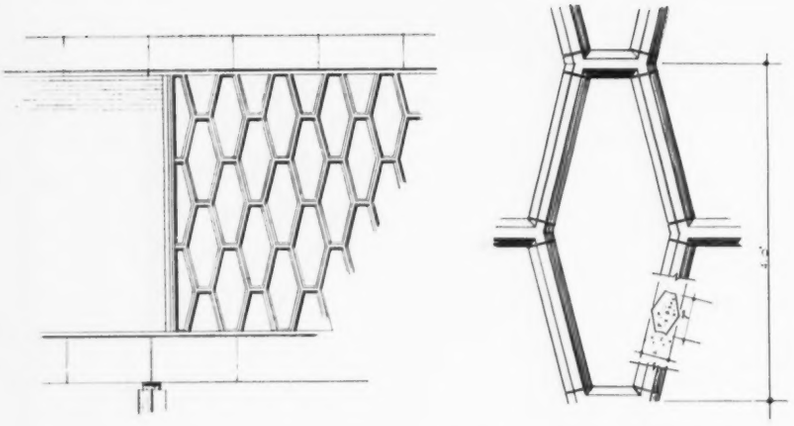
The Princeton Faculty and Administration established as an important prerequisite of the design for the new construction that it constitute an alternative to the traditional *eating club system*. The *Quandrangle*, as planned, will be occupied in part by those upperclassmen who do not join clubs, as well as by some sophomores and some upperclassmen who are members.

To meet this need, the architects provided a separate building to house the complete social needs of the students—a library, dining room, game and recreation rooms and a series of guest rooms so that students can house their dates over week-ends or the University can accommodate visitors. The meeting rooms, with intercommunicating doors, are of various sizes, each with folding curtain partitions. No matter what type of activity is to be conducted in the building, there is a room or combination of rooms suitable for it.

The dormitory design was based on a careful investigation of the manner in which students live on campus. "We were very careful, however, to provide sufficient versatility so that should patterns of dormitory life change 10 or 30 years hence, the buildings could be modified to meet this change with a minimum of additional construction," explained Architect Lester Smith.

Living accommodations vary from a single room with bath to an eight-man split level suite with two-story living room and two baths, one on each level. Currently, the University has a heavy demand for accommodations for groups of three to six students, and the bulk of the rooms are arranged for such groups. Should this change in the future, smaller or larger units can be arranged with the modification of a few partitions.

(Continued on next page)



Architects' study details of grille for Central Building Facility. At left, partial elevation. At right, close detail view of single unit.

Dormitory life

The architects' survey of dormitory life came up with two primary insights: (1) the students required a large amount of seating accommodations. "Bull sessions" were common and felt by most students to be a most rewarding part of the over-all educational climate. For this reason, other types of furniture were minimized so that there would be room for seating. (2) There was a need for a single, attractive durable unit that could provide a number of special functions, as well as serve as the central focus of the room, replacing the fireplace. The unit includes bookcase, housing for hi-fi, radio and TV; a display area for trophies and "geegaws"; storage for personal belongings such as notebooks, athletic equipment; a coat rack; and a refrigerator. The latter addition to dormitory life was a concession to practicality. It was found that elsewhere on campus, students purchased second-hand refrigerators and installed them in an unsightly way in the living room of suites. The University felt that this obvious need should be met in a more effective and aesthetic way.

Entry system

The above omnibus unit was designed by the architects in the form of a room divider, 5-feet in height, which shields the living room of a suite from the bedrooms.

The dormitory building preserves the University's "entry system," as differentiated from a "corridor system." It was felt that part of the charm of the institution was its beautiful campus. Since no room will be more than two stories from ground level, entries will provide access to the campus.

"We believe that corridors, with rooms on both sides, is wasted space and gives a rather cold and institutional feeling," Mr. Smith said. "In many unversities where dormitory corridors are used, disciplinary problems have resulted—corridors seem to encourage the kind of horsing around that is the bane of most administrators." Students were consulted in reviewing the architectural plans. In a number of instances, they were able to make worthwhile suggestions, in addition to expressing their enthusiasm about the new facilities under construction.

General features of site and buildings

The *Quadrangle* group will be built on the existing tennis court area in the main campus block bounded by Nassau St., Washington St., and Elm Drive at Princeton.

The *Quadrangle* formed by the dormitory and central facility will have the character and size of the present Princeton quadrangle. Materials used in the new building will reflect the present Princeton materials such as local stone, brick and windows with limestone trim. There will be several features for the dormitories and the central facility. In the dormitories there will be limestone grilles enclosing the stair halls. In the Central Facility a large scale limestone grilling for screening the porch area from the lounge area is planned. Parking facilities will be provided at areas adjacent to existing buildings.

Dormitory units

Five dormitory units will be required to house the following:

NUMBER	*TYPE*	*TOTAL BEDS*
40	*Single*	*40*
1	*Typical 2-man*	*2*
3	*Typical 3-man*	*9*
23	*Typical 4-man*	*92*
4	*Typical 5-man*	*20*
2	*Typical 6-man*	*12*
1	*Maisonette 4-man*	*4*
2	*Maisonette 7-man*	*14*
4	*Split-level 6-man*	*24*
80		*217*
3	*Faculty*	*3*
83		*220*

Central Facility building

This building will have lounge area, club room, dining room, special dining, meeting rooms, library for 10,000 to 12,000 volumes and a dormitory on roof for 38 male, female, or both, guests. The kitchen is designed not only to serve the dormitory students, but also to act as a central frozen food storage area for the campus, and also to do catering service for University receptions or parties.

Construction stages

Plans call for the *Quadrangle* to be constructed in two stages. The first phase, which will be ready by 1960, will consist of the social center plus five dormitories. The second phase will see the construction of anywhere from three to five additional dormitories. In all, 400 students will be housed.

Structural information

Dormitory units will be reinforced concrete construction with floor supported by hollow rectangular columns. Slab thickness will be 8". The Central Facilities building will be structural steel frame with bar joists, concrete slab and hung ceilings.

Heating, ventilating and air-conditioning

Dormitory heating will be hot water, fin tube convectors. Central Facility building because of the nature of the spaces, will be heated by warm air. Low pressure steam as a power source for the dormitories and the Central Facility will be the University's central steam plant.

Electrical

Two load centers in the dormitory facility group. One load center would be in the social facility with the primary feeder entering from the east. Two of the dormitory units would be fed from this center with direct secondary lines to each. The other load center would be located in one of the dormitory units with the primary feeder entering from the west and would feed two of the dormitory units.

Costs

Construction contract (excluding site work):	$2,495,000.00
Total gross floor area (approx.):	120,000.00 sf
Total gross cubage (approx.):	780,000.00 cf
Cost per square foot (approx.):	$20.79
Cost per cubic foot (approx.):	$3.19

literature

Literature cited in this department is available from various manufacturers and associations free of charge. To obtain copies, circle the keyed numbers on the reader service cards facing pages 8 and 32.

Ceramic tile

A complete ceramic tile sample file is offered by United States Ceramic Tile Co. Six complete color palettes of actual tile chips are mounted on separate panels displaying 161 colors, textures and finishes. Palettes separate by type—natural clay, porcelain, glazed tile, etc., for simplified selection. The 8½″ x 11″ open end file container is compact for desk or field. (6 pallettes)

AIA file no. 23-A

MFR: UNITED STATES CERAMIC TILE CO.
Circle 210

Fusible service equipment

A bulletin has been issued by Federal Pacific Electric Co. to introduce its line of Type SF fusible service equipment. Detailing the entire "stab-in" fusible system, the catalog covers "stab-in" units, enclosures, features and accessories. Text and illustrations explain the use of only ten enclosures and five "stab-in" units replacing 208 previous devices to meet all fusible service requirements up to 200 amps. Other features covered are combination flush/surface mounting, locking clips on "stab-in" units, insulated groundable neutral, bus bar arrangements, two-way pressure stabs, UL approved lugs for copper and aluminum conductors, narrow-width, shallow depth enclosure contruction, and the use of the system as an off-peak water heater device. Application information includes technical data and wiring diagrams. Contained also, is information on interchangeable hubs, adapter frames for extra trim overhang, and other accessories. (12 pp.)

AIA file no. 31

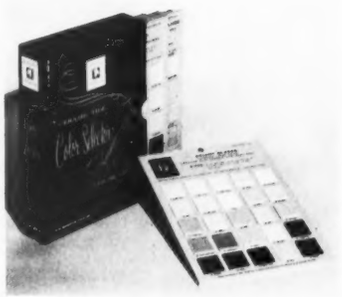
MFR: FEDERAL PACIFIC ELECTRIC CO.
Circle 211

Acoustical sections

Acoustical suspension sections are illustrated in a descriptive brochure issued by the Brasco Mfg. Co. Included are channels, moldings, suspension tees, roof deck cross tees and necessary parts and accessories. The brochure may be helpful in selection and specification of metal suspension sections utilized in acoustical treatment of ceilings and walls. Described are painted moldings of galvanized steel, bonderized and coated with vinyl baked-on enamel, mitre moldings designed to hold ½″ and ¾″ tile, and the "One Hand Clip" (patent applied for) of tempered steel which permits holding and securing channels with one hand, without waste motion. Clip automatically centers itself to all channels and adjusts to possible variations in channel widths. According to mfr, contractors report savings of 25 per cent to 33 per cent in installation time when the "One Hand Clips" are used in applying acoustical sections to normal ceilings. (6 pp.)

AIA file no. 39-B-1

MFR: BRASCO MFG. CO.
Circle 212



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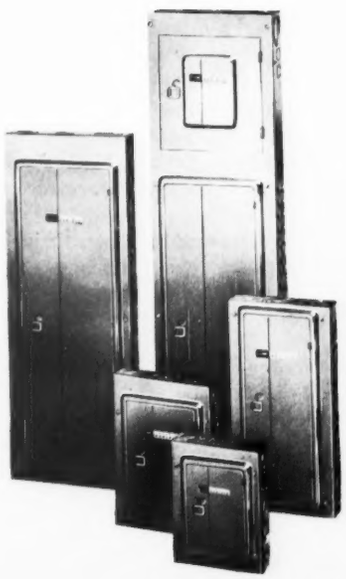

211

Contemporary clocks

Howard Miller Clock Co. presents its 1959 catalog of contemporary, George Nelson-designed, clock models for floor, wall and desk variations. Some 27 designs are included in all. Mfr claims models are distinctive accessories for home, office, etc. (12 pp.)

AIA file no. 35-N-4

MFR: HOWARD MILLER CLOCK CO.
Circle 213

Filing systems

Plan Hold Corp., mfr of vertical and roll filing systems, has issued its 1959 catalog. Improved items of special interest to architects and engineers are included. Catalog also contains illustrations of all products. (12 pp.)

AIA file no. 35-H-42

MFR: PLAN HOLD CORP.
Circle 214

Concrete curing tape

An illustrated bulletin describes one of Presstite's recent developments in the field of sealants. Called "ConSeal," (Presstite CD 579.1) the product has been designed to cure sawed or formed concrete joints and also to keep the joints clean until they are sealed, according to the mfr. Economies of applications are also described. (4 pp.)

AIA file no. 24-A

MFR: PRESSTITE-KEYSTONE ENGINEERING PRODUCTS CO.
Circle 215

Cedar siding

Recent pamphlet issued by Western Red Cedar Lumber Assn. lists uses of cedar siding in both interior and exterior settings. Assn. claims material is competitively priced and excels in durability, dimensional stability, ease of application and insulative quality. (4 pp.)

AIA file no. 19-D-2

ASSN: WESTERN RED CEDAR LUMBER ASSN.
Circle 216

Reflective insulation

Technical bulletins describing the application of Borg-Warner's "Alfol" aluminum foil reflective insulation in electrically heated homes are offered by Reflectal Corp., architectural subsidiary of Borg-Warner Corp. Literature covers applications in areas with design temperature of minus 20°, 0° and plus 20°. Heat loss data, in terms of watts/sq. ft., are provided to show effects of using various types of "Alfol" to insulate ceilings, frame and masonry sidewalls, crawl spaces, and between floors over both heated and unheated basements. The U-factor for each type is also supplied. For architects and engineers planning electric heat installations, a sample calculation that can serve as a guide in making similar calculations for individual reflective insulation applications is provided. The calculation

literature

takes into account the type of reflective insulation used, the area being insulated, temperature difference, watt loss value and total heat loss in watts per hour.

AIA file no. 37-C-3

MFR: REFLECTAL CORP., SUBS. OF BORG-WARNER CORP.
Circle 217

CURTAIN WALLS

Glass curtain wall

An AIA file has been prepared by Kimble Glass Co., subs. of Owens-Illinois, describing the "Thinlite" curtain wall system for architectural use. Sections are devoted to product's features, suggested uses, installation procedures, component parts and extensive diagrammatic details. Additional developments in the system include rectangular, prismatic glass shapes and ceramic fired-on colors. Panels are composed of hollow glass tile, incorporating prismatic principle of solar selection. (29 pp.)

AIA file no. 17-A

MFR: KIMBLE GLASS CO., SUBS. OF OWENS-ILLINOIS
Circle 218

Curtain wall systems

Ualco Lifetime Aluminum Curtain Wall Systems, a recent publication of Southern Sash Sales & Supply Co., Inc., lists specifications and shows sectional, assembly and installation details of four "Ualco" aluminum curtain wall systems. Catalog also includes photographs of institutional, educational and commercial buildings in which product has been installed. (12 pp.)

AIA file no. 17-A

MFR: SOUTHERN SASH SALES & SUPPLY CO.
Circle 219

Tracings folios

Complete drawings and specifications for Reynolds Metals commercial projected aluminum windows Series 500 and for Reynolds Economy Wall System 101 are supplied in two new slip-sheet file holders. The drawings are printed on tracing paper for convenient use. Economy Wall, a curtain wall system for one and two-story buildings, provides windows and panel sections in single units, eliminating labor otherwise necessary to assemble various parts. The projected aluminum windows are designed for commercial, institutional, industrial and apartment use. Superior structural strength with new ease of operation is stressed.
AIA file no. 16-E/17-A

MFR: REYNOLDS METALS CO.
Circle 220

Steel curtain walls

Armco Steel Corp. has published six sheets on porcelain enamel and porcelain enamel-stainless steel curtain walls. Subjects covered are office buildings, commercial buildings and elementary schools. Design structural data and cost data are given with photographs, plans, details and other information. (4 pp.)

AIA file no. 15-H-2

MFR: ARMCO STEEL CORP.
Circle 221

WINDOWS

Aluminum units

Catalog published by Southern Sash Sales & Supply Co., Inc., lists specifications and features, and shows sectional details and standard and modular sizes, for more than twenty types of windows in the Ualco line. Also included are full color and black and white photographs of several buildings in which Ualco windows and aluminum curtain walls have been installed. (40 pp.)

AIA file no. 16-E

MFR: SOUTHERN SASH SALES & SUPPLY CO., INC.
Circle 222

Aluminum windows/screens

This 1959 catalog on Ceco Steel Products aluminum windows and screens, describes range of aluminum units in a number of details (half and full size), photographs, and glass and size schedules. Residential, commercial and monumental window types illustrated. Installation details and suggested specifications given. (28 pp.)
AIA file no. 16-E

MFR: CECO STEEL PRODUCTS CORP.
Circle 223

Window accessories

Caldwell Mfg. Co. offers catalog describing sash balances. Specifications on "Helix," "Spirex" and "Clockspring," and their range of sizes, are included. Listed are outstanding installations, including the United Nations Secretariat Building, equipped throughout with Caldwell sash balances. (8 pp.)

AIA file no. 35-P

MFR: CALDWELL MFG. CO.
Circle 224

Window glass

Catalog of Libby-Owens-Ford Glass Co. illustrates varied line of flat, patterned and wired glass for doors, windows, mirrors, store fronts, photograph coverings etc., in residential, commercial and institutional projects. Among salient features described are: heat absorbency, bullet resistancy and reduction of glare. Safety, insulating and corrugated glass are included, with installation procedures, available finishes, relative humidity charts, charted dimensions and other engineering data. (36 pp.)

AIA file no. 26-A-1

MFR: LIBBEY-OWENS-FORD GLASS CO.
Circle 225

MISCELLANY

Chalkboards/bulletins

The Claridge Products & Equipment Co. offers "Catalog 59," describing and illustrating its line of chalkboards, bulletin boards and aluminum trim. Designed especially for the architect and specifier, the catalog includes informative product descriptions on each item, with helpful specification data, line drawings showing construction details, and recommended installation. Catalog features such related items as: bulletin board cabinets, trophy and display cases, reversible chalkboard, sliding chalkboards, swing leaf bulletin boards, portable chalkboards and bulletin boards, plus snap-on extruded aluminum trim, aluminum map rail, etc. (24 pp.)

AIA file no. 35-B-11

MFR: CLARIDGE PRODUCTS & EQUIPMENT CO.
Circle 226

Roof deck

"New Dimensions in Ceiling Design," a booklet prepared by Insulite, enumerates how "Insulite" roof deck can be used in residences and other flat

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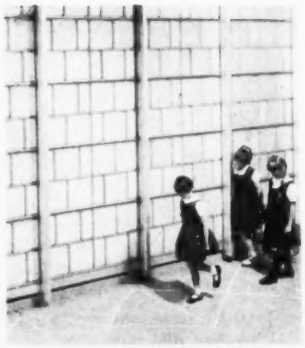

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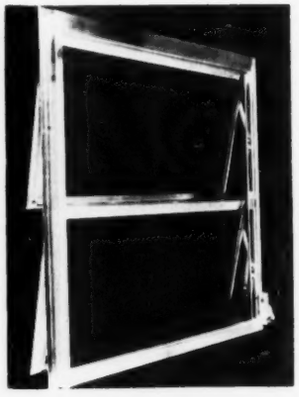

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or low-pitch roofed structures. Illustrations of homes and commercial buildings designed and built with "Insulite" roof deck are included, with sections on beam size tables, showing the permissible minimum nominal dimensions of acceptable beams, and construction details. (20 pp.)

AIA file no. 37-B-2

MFR: INSULITE, DIV. OF MINNESOTA AND ONTARIO PAPER CO.
Circle 227

FLOOR MATERIALS

Sub-flooring

A folder describing floor underlayment with the use of "Versabord," a special purpose particle board produced by the Silvatek Product Div. of Weyerhaeuser Timber, has been issued. Illustrations show installations under a variety of flooring materials—tile, linoleum and wall-to-wall carpeting. Freedom from grain and knots, uniformity of thickness and the material's resilience are stressed as characteristics that would enhance appearance and maintenance life of any applied finished flooring. Panel size, nail and staple-holding qualities, and freedom from delaminating, splintering or cracking are also stated as features of "Versabord." (4 pp.)

AIA file no. 19-E-9

MFR: SILVATEK PRODUCTS DIV., WEYERHAEUSER TIMBER CO.
Circle 228

Wood flooring

Maple Flooring Mfr's Assn. presents photographic interpretation of grades of hard maple flooring in a current bulletin. Unaltered photographs show variations of natural tone in three grades of hard maple. Recommended uses are included, with dimensions and mfr's guarantee. (4 pp.)

AIA file no. 19-E-91

ASSN: MAPLE FLOORING MFRS. ASSN.
Circle 229

Tile colors

The 1959 Vinyl Asbestos Tile Color Classification Chart, issued by the Asphalt and Vinyl Asbestos Tile Institute, covers the variety of colors, shades and patterns that are currently available in such makes of tile as: Armstrong, Azrock, Bonafide, Congoleum, Goodrich, Johns-Manville, Kentile, Matico and Tile-Tex. Helpful to those who wish to purchase or specify vinyl asbestos tile, the chart states the available colors in the marbleized, terrazzo, and cork patterns, and also indicates the various tiles that give the same general color tone or effect. (4 pp.)

AIA file no. 23-G

INST: ASPHALT AND VINYL ASBESTOS TILE INST.
Circle 230

Block flooring

"Kreolite" wood block flooring, designed to meet the practical requirements of all types of production facilities, is described in a technical bulletin of the Jennison-Wright Corp. Quick installation, low maintenance cost, noise and vibration absorbency, resiliency, insulation against heat and cold, and durability are listed by mfr as advantages. Also included are specifications and installation suggestions. (8 pp.)

AIA file no. 11-F

MFR: THE JENNISON-WRIGHT CORP.
Circle 231

Wood flooring

Mosaic hardwood blocks for varied flooring finishes are illustrated in color in bulletin of Wood-Mosaic Corp. Architects' specifications, dimensions, choice of finishes and instructions for installation are described and pictured. (8 pp.)

AIA file no. 19-E-9

MFR: WOOD-MOSAIC CORP.
Circle 232

Vinyl/rubber tile

The General Tire & Rubber Co. describes "Bolta Floor," a vinyl and rubber flooring material, in recent literature. Various types and patterns are illustrated in color and architectural specifications are included. Mfr recommends product for commercial, institutional and residential use, for floors, walls and counter tops. (16 pp.)

AIA file no. 23-G

MFR: THE GENERAL TIRE & RUBBER CO.
Circle 233

Floor preservatives

Two maintenance materials have been announced by Rock-Tred Corp. in recent bulletins. Bulletin A-1295 describes product "Moratred," used for resurfacing and patching new or old concrete, wood or steel floors. Also provides non-skid surface on ramps, stairs, etc. Chemical and solvent resistant qualities offer protection against the damaging effects of alkalies, acids, salt solutions, carbon tetrachloride, oils, greases and many petroleum solvents, according to mfr. Recommended application of product for floors in process industries, oil refineries, garages, service stations etc. May be applied at any thickness from $\frac{1}{64}$" to 1" or more. Bulletin A-5095 describes product "Moraset," a liquid material specially formulated for filling and sealing cracks, small holes, spalled and etched areas, etc. in concrete, terrazzo, ceramic and quarry tile floors and walls, indoors and out. Abrasive may be added for non-slip surface. Mfr states cracks filled and sealed with product improve sanitation and safety by eliminating the mold and bacteria harboring areas in such industries as food and drug, brewing, explosive, etc. Application instructions, coverage per gallon and other technical data included. (2 pp. each)

AIA file no. 25-G

MFR: ROCK-TRED CORP.
Circle 234

Plastic/asbestos tile

Tile-Tex, div. of The Flintkote Co., recently issued a brochure proclaiming the characteristics of "Vitachrome," a plastic-asbestos floor tile resistant to grease, and "Tuff-Tex," a tile designed for industrial use. Durability of the products is stressed and listing of installations is included (4 pp.)

AIA file no. 23-G

MFR: TILE-TEX, DIV. OF THE FLINTKOTE CO
Circle 235

Flooring

Loxit Systems, Inc. stress advantages of its wood floor laying system in current literature. Also included are specifications, isometric details, and methods of installation. Mfr claims simplicity of system ensures economy while maintaining permanence and floor beauty. (8 pp.)

AIA file no. 19-E-9

MFR: LOXIT SYSTEMS, INC.
Circle 236

Mats/treads

American Floor Products Co. offers literature on rubber and vinyl plastic mats and treads. Brochure illustrates products and includes specifications of sizes, colors and nosings for architectural use. (4 pp.)

AIA file no. 28-E

MFR: AMERICAN FLOOR PRODUCTS CO.
Circle 237

Interlocking units

"Rubberlock," invisibly interlocking rubber tiles, is the subject of a current bulletin, illustrated in color, from American Floor Products Co. Ease of installation over any type of sub flooring and lack of maintenance problems are stressed as advantages by mfr. (4 pp.)

AIA file no. 23-G

MFR: AMERICAN FLOOR PRODUCTS CO.
Circle 238

LIGHTING/SOUND

Emergency lighting

Emergency lighting, designed for commercial and institutional construction, is described in current literature of the Standard Electric Time Co. Mfr states systems, UL-listed and designed according to National Electrical Code, are completely automatic in both operation and recovery. Distribution panels, power supplies and fixtures are also described, and specifications given on all items. (20 pp.)

AIA file no. 31-F

MFR: STANDARD ELECTRIC TIME CO.
Circle 239

Industrial lighting

Booklet on industrial lighting is offered by Day-Brite Lighting Inc. Fixture cost comparisons, cost of lighting per sq. ft., and numerous installations are illustrated. (16 pp.)

AIA file no. 31-F

MFR: DAY-BRITE LIGHTING INC.
Circle 240

Wall plate chart

"Building block" concept of wall plate assembly introduced recently in a Decorator Series is illustrated on a chart offered by GE, as a reference help. Chart, measuring 21½" x 34", suggests solutions to wall plate problems arising in combination of wiring devices. Illustrates some of the more than 100,000 switch and outlet wall plate combinations which can be assembled from a basic stock of 13 in-

literature

serts and four sizes of frames. Chart permits immediate visualization of combinations of frames and inserts. Textured metal inserts, gold and silver-colored are shown as they would look mounted in ivory or brown plastic frames on wall paper, painted surface and wooden paneling. Clear plastic inserts are shown framed, backed with wall paper to match the background.

AIA file no. 31-D

MFR: GENERAL ELECTRIC
Circle 241

School sound equipment

Dukane Corp. publicizes the "Hi-Power" intercom sound system, designed for the small school, in a recent bulletin. Applicable as either a private intercom unit or public address system for auditoria. Simplicity of operation is stressed by mfr. Specifications included. (single sheet)

AIA file no. 31-I-7

MFR: DUKANE CORP.
Circle 242

STRUCTURAL ELEMENTS

Laminated arches

Standard specifications and design for glued laminated arches are the subject of a publication of the Western Pine Assn. All specifications and developments result from analysis made by the Western Pine Assn. research laboratory. Specifications include grading rules, working stresses, modification of stresses and vertical laminations. Details on end joints and adhesives are also included. (12 pp.)

AIA file no. 19-K

ASSN: WESTERN PINE ASSN.
Circle 243

Laminated units

Timber Structures, Inc. has issued its 1959 brochure detailing arches, beams, decking, domes, rigid frames and trusses of wood composition. "Glulam," glued, laminated timber structures provide strength and adaptability for clear, unobstructed spans according to mfr. Load tables, specifications, and other engineering data for structural members and illustrations of recent installations are included. (24 pp.)

AIA file no. 19-B-3

MFR: TIMBER STRUCTURES, INC.
Circle 244

Trussed rafter designs

Two trussed rafter designs prepared specifically for use in component construction are now available from Timber Engineering Co. Accommodating spans of 24′-8″ and 28′-8″, the designs are for a spacing of 24″ on centers and a roof slope of 4/12 with a combined live and dead load of 35 lbs. per sq. ft. Proper anchorage details with "Trip-L-Grip" framing anchors are shown on each design. Using 2½″ "Wedge-Fit" split rings throughout, trussed rafters built in accordance with designs require no expensive presses or jigs for proper fabrication and assembly, according to mfr. Teco estimates an investment of less than $200 is needed to set up fabricating facilities. (single sheet)

AIA file no. 13-C

MFR: TIMBER ENGINEERING CO.
Circle 245

Cellular unit system

The Flexicore Co. describes, in recent literature, how the American Concrete Institute made use of precast hollow cell floor slabs for underfloor electrical distribution and for heating and air-conditioning in their Headquarters Building in Detroit. Building, designed by Minoru Yamasaki, features innovations in concrete building materials, structural design and construction methods. Included in the folder are photographs and detail drawings of the building's structural, electrical and air distribution systems. (6 pp.)

AIA file no. 40-K

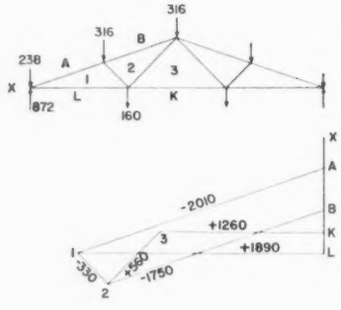
MFR: THE FLEXICORE CO., INC.
Circle 246

Steel joists

Ceco open-web steel joists, steel roof deck, and "Cecor" centering, for construction of light-weight roof and floor systems are described in booklet #3001-0 and accompanying load tables bulletin #3009-A. Booklet 3001-0 contains complete descriptions and diagrams of open-web steel joists, including Ceco's series "S," "L," and "E/C." Series "E/C" are electro-channel joists with top chord replaced by a hollow duct serving both as structural member and underfloor electrical distribution duct allowing wiring of outlets at any point along the joist. Also included is information on Ceco's steel roof deck and centering used as permanent form material for concrete slabs over steel joists or beams. Booklet is complete with tables of available dimensions, allowable loading, complete specifications, and recommended handling and erecting procedures. Tabular data of booklet is supplemented by the load tables booklet, containing all needed data for architects and designers. (28 pp., 32 pp.)

AIA file no. 13-G

MFR: CECO STEEL PRODUCTS CORP.
Circle 247



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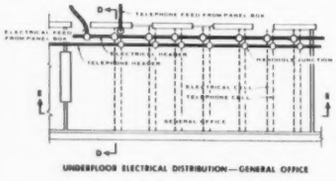

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247

Contemporary uses

"Tim-Press," monthly publication of Timber Structures, Inc., emphasizes the role of wood in contemporary architecture and construction. Listed are structures utilizing wood, and illustrated is a completed school designed for expansion and comparative low cost. National Lumber Mfr's Assn. claims utilization of wood permits significant savings. (8 pp.)

AIA file no. 19-B-3

MFR: TIMBER STRUCTURES, INC.
Circle 248

PLASTICS

Plastic panels

Data on translucent "Hetron" panels, designed for applications in industrial buildings, schools, and other institutional buildings for large area installations where codes, insurance laws, or safety considerations indicate that flame retardance is important, is contained in Bulletin no. 64, offered by Durez Plastics Div., Hooker Chemical Corp. Mfr claims use of flame-proof resins in manufacture of product results in extremely low percentage of flame spread while not causing harmful effects to the product's strength or weather resistance. (7 pp.)

AIA file no. 23-G

MFR: DUREZ PLASTICS DIV., HOOKER CHEMICAL CORP.
Circle 249

Fibrous glass panels

A folder for architects and engineers, containing revised specifications on

residential and industrial translucent fibrous glass panels, is available from Alsynite Company of America. Itemized are light and heat transmission values for 30 different "Alsynite" panels, including flat panes for window glazing. Brief technical test reports by Chemiglas, Inc., a scientific research organization, on "Alsynite's" flammability, insulation value, load strength, impact and chemical resistance and other characteristics, are also covered. (4 pp.)

AIA file no. 26-A-9

MFR: ALSYNITE COMPANY OF AMERICA
Circle 250

Acrylic domes

Plastic dome skylights are schematically portrayed in current literature of the Pam Co. Pam skylights are lightweight, composed of acrylic plastic, average 2 lbs. psf, according to mfr. Diagrams give typical installations for optimum translucency and reduction of solar heat, and specifications for square, rectangular and circular domes are included. (12 pp.)

AIA file no. 12-J

MFR: THE PAM CO.
Circle 251

Vinyl wrinkle finishes

A technical bulletin describing the use of vinyl plastisols, organosols and solutions in the formulation of vinyl wrinkle coatings, has been issued by Union Carbide Plastics Co., Div. of Union Carbide Corp. (5 pp.)

AIA file no. 24-B

MFR: UNION CARBIDE PLASTICS CO., DIV. UNION CARBIDE CORP.
Circle 252

PIPING

Pipe

The Babcock & Wilcox Co., tubular products div. has released "Technical Data Card-191" covering pipe dimentions and weights. Pipe sizes ⅛"-36" are included in seamless and welded types. (4 pp.)

AIA file no. 29-B

MFR: THE BABCOCK & WILCOX CO.
Circle 253

Acid resistant pipe

Successful elimination of corrosive waste materials through use of "Pyrex" drainless is the substance of "Bulletin PE-30" issued by the Corning Glass Works. Hydrofluoric acid, caustic soda and chromic acid are among a list of 100 chemicals and chemical combinations which have no effect on the product. Mfr cites competitive price, less scale build-up, transparency and light weight among product's advantages. Installations shown illustrate durability of "Pyrex." (8 pp.)

AIA file no. 29-B-81

MFR. CORNING GLASS WORKS
Circle 254

HVAC

Metal gas vent

A catalog covering construction features, typical installations, specifications and ordering information on the entire line of Van-Packer vent pipe and fittings, has been issued by the Van-Packer Co. Metal gas vent unit is a double-wall, air-insulated vent system with interlocking joints. It is available in both round and oval pipe with all necessary fittings to meet any architectural requirement; UL listed for type B and Type BW applications. (16 pp.)

AIA file no. 30-D-4

MFR: VAN-PACKER CO.
Circle 255

Heat exchangers

Advantages of aluminum usage in heat-exchanger fabrication are described in a publication issued by Reynolds Metals Co. Text covers aluminum heat transfer rates, temperature properties, tensile strengths, pressures and dimensional tolerances. Charts provide fingertip information on aluminum stress values, working pressures, thermal expansion and conductivity and friction factors. Given as advantages of aluminum are lower cost, corrosion resistance, maximum heat transfer, light weight and resistance to fouling. (16 pp.)

AIA file no. 30-L

MFR: REYNOLDS METALS CO.
Circle 256

Electric heaters

Edwin L. Wiegand Co. offers a catalog illustrating the "Chromalox" electric comfort heaters for residential, commercial and industrial applications. Illustrated are convection, forced-air and radiant heaters that may be surface mounted, built into the wall or installed in a duct system. Wall mounted thermostats, both line and low voltage models, are available for automatic temperature control. Heaters are suitable for either auxiliary heating or the complete system; for an added room or an entire building. Mfr says safe, clean heat provided, with accurate individual room control; compact design saves space, and simple installation allows heat source to be placed where it is needed most, along the outside wall where heat loss is greatest. (16 pp.)

AIA file no. 31-K-3

MFR: EDWIN L. WIEGAND CO.
Circle 257

Air filter

Current bulletin from Mine Safety Appliances Co. describes "Air Line Ultra Filter," designed for use with compressed air and other gas lines. Filter provides a minimum removal of 99 per cent by particle count of particulate matter 0.3 micron and larger diameter at rated flows in pneumatic control, instrument and pharmaceutical air lines, spray application of paints and other finishes, and purification of other compressed gases, according to mfr. Accessory elements are also available for gaseous contaminant removal. (2 pp.)

AIA file no. 30-D-3

MFR: MINE SAFETY APPLIANCES CO.
Circle 258

Induced draft fans

Induced draft fans are described in a two-color bulletin offered by Lehigh Fan & Blower Div., Fuller Co. Photographs and text describe advantages and features. For engineers and specification writers, fully-dimensioned drawings and charts of ratings and specifications are presented. Illustrations include detailed drawings, photographs of fans and schematic diagrams of installations. (16 pp.)

AIA file no. 30-D-1

MFR: LEHIGH FAN & BLOWER DIV., FULLER CO.
Circle 259

Induced draft fans

Features and capabilities of induced draft fans are discussed in a bulletin offered by Lehigh Fan & Blower Div. of Fuller Co. Mfr states fans reduce stack maintenance costs and improve combustion in either hand-fired or mechanically-fired boilers. Also discussed are Lehigh's air-cooled fan wheel which permits operation in temperatures up to 800°F and use of air-cooled, oversize bearings. Schematic drawings, dimensioned diagrams and photographs demonstate unit's versatility and construction. (4 pp.)

AIA file no. 30-D-1

MFR: LEHIGH FAN & BLOWER DIV., FULLER CO.
Circle 260

Blowers and fans

"Live Even Better," recently published by the Emerson-Pryne Co. and Rittenhouse, is a condensed, pocket-sized catalog of their complete line of fans and blowers, recessed lights, ceiling heaters, chimes and intercom systems. Specifications and retail price list are provided, with illustrations also included. Diagrams portray installation for maximum utility. (64 pp.)

AIA file no. 30-D-1

MFR: EMERSON PRYNE CO. AND RITTENHOUSE
Circle 261

Dehumidifiers

Abbeon Supply Co. has issued its bulletin #512, showing equipment for measuring humidity and dehumidifying various sized areas. Bulletin contains answers to some frequent dehumidification queries. (6 pp.)

AIA file no. 30-D-5

MFR: ABBEON SUPPLY CO.
Circle 262

MASONRY/CERAMICS

Tile units/patterns

American-Olean Tile Co.'s comprehensive 1959 catalog, illustrated in full color, stresses "Crystalline Glazes" for commercial and residential installations. Also covered is a line of glazed and unglazed tile for walls, floors and specialized uses, and china bathroom accessories. Given are details, mortar and setting bed applications and other design and layout data. (32 pp.)

AIA file no. 23-A

MFR: AMERICAN-OLEAN TILE CO.
Circle 263

Exterior facing

"Granux," a manufactured, structural masonry material designed for ex-

literature

terior facing of buildings, is described in a pamphlet now offered by Granux Corp. Product is available in 60 colors, both original and those of quarried granite. Usual thickness of "Granux" is 2¼" but variations in both size and strength are available. Diagrammatic drawings illustrate product's advantages, some of which mfr claims are: distinctive color and permanence of installation. (16 pp.)

AIA file no. 8-B-3

MFR: GRANUX CORP.
Circle 264

Surface treatments

Master Builders Co.'s *Product Data Guide* contains detailed information covering usage of major concrete and masonry products. Publication includes data on estimating needs for and description of "Pozzolith," "Embeco," "Masterplate," "Anvil-Top" and others. Regular users of concrete admixtures, floor products, grouting and waterproofing material and other related products may find this a helpful guide. (6 pp.)

AIA file no. 3-B-1 and 3-B-2

MFR: THE MASTER BUILDERS CO.
Circle 265

Clay tile units

Full color brochure on ceramic solar screen has been published by the Architectural Products Div., Gladding, McBean & Co. Brochure illustrates, describes and provides specifications for different designs in which product is available. Mfr states ceramic solar screen provides an excellent medium for shielding a building from the sun while adding to its decorative beauty. Maintenance is reported as negligible because of color permanence. (4 pp.)

AIA file no. 10-A

MFR: GLADDING, MCBEAN & CO.
Circle 266

ELECTRO-DISTRIBUTION

Conduit handbook

Handbook and catalog of Spang conduit and fittings has been issued by National Supply Co. Edition, bulletin no. 485, features brief illustrated descriptions of installations in many types of buildings: industrial plants, office buildings, hospitals, schools, hotels and apartments. Described also is manufacturing process of galvanized conduit and EMT. Technical section includes: (1) Spang conduit specifications and other data for use in estimating and planning electrical installations; (2) standard symbols and abbreviations for use on drawings and; (3) applicable electrical data compiled by National Fire Protection Assn. American Standards Assn. specifications for various types of conduit and electrical metallic tubing are included. (60 pp.)

AIA file no. 31-C-62

MFR: NATIONAL SUPPLY CO.
Circle 267

Supply/distribution systems

"Flexalab" systems, including switchboards, power supplies, service units, motors and generators and dynamometers, are illustrated and technically described in a recent catalog of The Standard Electric Time Co. Details of equipment and accessories necessary for electric shops are given, with general specification for shop distribution. Mfr states "Flexlab" systems are extensively used in industry and in university and government laboratories. Systems are UL listed. (16 pp.)

AIA file no. 31-C

MFR: THE STANDARD ELECTRIC TIME CO.
Circle 268

Corrosion-proof units

"Condulets for Corrosive Locations," a bulletin issued by Crouse-Hinds describes corrosion-resistant properties of a variety of metals and finishes used in Crouse-Hinds "condulets," with simple charts showing the applications of each. Also contained are formal listings of "Plast-A-Coat" condulets for hazardous and non-hazardout locations. (16 pp.)

AIA file no. 31-C-62

MFR: CROUSE-HINDS CO.
Circle 269

Electrical generators

A series of educational pamphlets covering electrical and technical characteristics of engine driven generating equipment has been published by D. W. Onan & Sons Inc. Pocket-sized bulletins deal with technical phases of Onan products, (electric generating plants, air-cooled engines, separate generators) their operation and use. Combining lay and technical language, pamphlets may help both the initiate and the expert in the technical fields covered. (6, 2, 6 and 4 pp.)

AIA file no. 31-A

MFR: D. W. ONAN & SONS INC.
Circle 270

Distribution system

Engineering data on "Spang Headerduct," a wire distribution system, is stressed in the National Supply Co.'s Bulletin No. 490. Covered are the components of "Spang Headerduct," which are coordinated with cellular floor construction for electrical and communication wiring. Detail drawings with essential dimensions and identifying numbers are given for use on system layouts and specifications. Also given are installation instructions, service fittings and specifications. (28 pp.)

AIA file no. 31-C-62

MFR: THE NATIONAL SUPPLY CO.
Circle 271

Distribution transformers

Illustrated bulletin describes oil-filled, single-phase, pole-type conventional and self-protected transformers for industrial, commercial and recreational floodlighting applications. Publication includes description of product features, data on loading of distribution transformers for sports-lighting installations, and complete rating information on units from 5kva to 167 kva. (2 pp.)

AIA file no. 31-B-3

MFR: GENERAL ELECTRIC
Circle 272

Auxiliary power

A recently issued folder describes and illustrates separate electric generators manufactured by D. W. Onan & Sons. Mfr states these generators provide dependable electric power for draglines and shovels on construction sites, magnet cranes for industry and as emergency standby units on farms, dairies and greenhouses. Three types of generators are described: AC models, 1,500 to 10,000 watts; battery charging models, 1,500 to 5,000 watts; and tractor-driven models, 4,000, 7,000 and 12,000 watt sizes. Precise specifications for various controls (AC switchboards, rheostats, wall mount switchboards and manual transfers) to operate each type of generator are described and illustrated. (4 pp.)

AIA file no. 31-A-2

MFR: D. W. ONAN & SONS INC.
Circle 273

DOORS

Hollow metal doors

Booklet no. C-60, from Truscon Steel, Div. Republic Steel Corp., describes characteristics of industrial steel doors of both swinging and sliding types. Suitability for factories, warehouses, depots, service stations and similar structures, mfr says, arises from doors' ability to withstand hard usage. Doors and frames are bonderized. Structural frame details are given. (8 pp.)

AIA file no. 16-A

MFR: TRUSCON STEEL, DIV. REPUBLIC STEEL CORP.
Circle 274

Vertical lift units

Overhead and vertical lift doors for industrial and commercial uses are treated in literature of the Ridge Door Co. Of wood, steel or aluminum composition, doors feature certified tension and torsion springs, support stiffeners and wedge type closing action. Generally available in widths from 8′ to 20′, and in heights from 7′ to 14′. General specifications included. (8 pp.)

AIA file no. 16-D

MFR: RIDGE DOOR CO.
Circle 275

Elevator doors

Catalog of the Security Fire Door Co. describes metal clad, steel plate and insulated steel doors for freight elevators, dumbwaiters and other types of automatic conveyors. Comprehensive diagrams explain the mechanics of operation. Mfr claims low initial cost and reduced maintenance as advantages. (16 pp.)

AIA file no. 33-G

MFR: SECURITY FIRE DOOR CO.
Circle 276

Overhead doors

McKee Door Co. has released catalog no. 32, describing "Overdoors" for

residential, industrial and service station use. Special range of paneling for decorative designs includes: raised panels, raised moldings, louver panels, decorative blocks, carved raised panels and flush doors. Extra clearance, continuous angle mounting, chain hoists, movable posts and vertical lift doors are among industrial door features. (16 pp.)

AIA file no. 16-D

MFR: MCKEE DOOR CO.

Circle 277

Automatic latching

Designed for commercial and residential use, the "Overdoor," mfr states, offers durable and dependable service. Recent publication of the Barber-Colman Company lists product's features and advantages, including automatic latching, one-piece vertical track support and extension springs for actual lifting. To blend with architectural design, doors are available in wide paneled, narrow paneled and flush designed styles. (4 pp.)

AIA file no. 16-D-1

MFR: BARBER-COLMAN CO.

Circle 278

PARTITIONS

Folding partitions

A technically descriptive brochure on the Haws folding partition is available from the Robert Haws Co. Partitions have a built-in hydraulic system which enables panels to conform to both floor and ceiling surfaces regardless of irregularities. Sponge rubber "feet" adhere firmly to surface, forming a wall rigid, solid and sound enclosing. Hinges are concealed within the panels and tracks and keepers are unnecessary according to mfr. Successful installations include schools, providing more sound proof teaching areas. (8 pp.)

AIA file no. 35-H-6

MFR: ROBERT HAWS CO.

Circle 279

Folding partitions

Folding, electrically operated partitions are described in current literature of Equipment Mfg. Co., Inc. Designed for large indoor areas such as gymnasia, auditoria, stages and classrooms, partitions have automatic operation and require no floor tracks or other permanent obstructions. Booklet includes operational specifications and section drawings. Mfr lists as features of product: clutch release, rubber floor seal and mortised door hinges. (8 pp.)

AIA file no. 35-H-6

MFR: EQUIPMENT MFG. CO., INC.

Circle 280

Aluminum partitions

Recent publication of R. C. Mahon Co. announces availability of aluminum "Roll Up" walls, designed to provide dividing walls for large areas such as: gymnasia, auditoria and natatoria. Power operated, walls roll up vertically and are stored overhead. Mullions also move to sides of area. Mfr stresses this as advantage for elimination of space consuming, vision obstructing storage pockets. Available also in stainless and galvanized steel. Booklet includes specifications.

AIA file no. 35-H-6

MFR: R. C. MAHON CO.

Circle 281

NON-FERROUS METALS

Aluminum conduit

Kaiser Aluminum and Chemical Sales, Inc. has published a price schedule for rigid aluminum conduit for electrical installations. Per-foot, delivered price of Kaiser Aluminum conduit now is considered by mfr to be competitive with steel conduit. Product is available in standard diameters ranging from ½" through 6", plus conduit couplings and 90° elbows.

AIA file no. 31-C-62

MFR: KAISER ALUMINUM AND CHEMICAL SALES, INC.

Circle 282

Bronze plaques

Recent catalog published by M. Greenberg's Sons illustrates plaques and letters in both bronze and aluminum, for ornamental purposes. Illustrations and section drawings show varied types of available styles. Installation methods and specifications are included. (20 pp.)

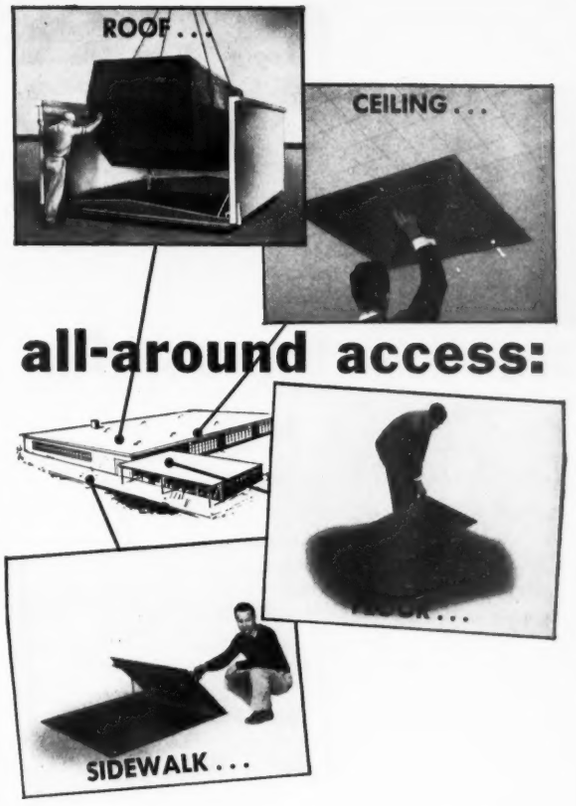
AIA file no. 15-R-1

MFR: M. GREENBERG'S SONS

Circle 283

Store fronts

Aluminum store front sections, including division bars, sashes, sills and



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Circle 139 for further information

literature

jambs in ten permanent colors, are described in a booklet issued by Kawneer Co. Firing process at 970° to 1000°F ensures permanence of colored porcelain enamel finish, accord-to mfr. Wind load tables, based on 15 psf or 65 mph included. (8 pp.)

AIA file no. 35-P-2

MFR: KAWNEER CO.
Circle 284

Brass handbook

Brass Pipe Handbook for Plumbing Installations, recent literature of the Copper & Brass Research Assn., enumerates notable installations of brass pipe as well as sections on pipe selection, cutting, threading, installation and layout. Of use to architects and engineers, contains design data, suggested layouts and specifications for brass and copper pipe and tubing. (24 pp.)

AIA file no. 29-B-4

ASSN: COPPER & BRASS RESEARCH ASSN.
Circle 285

SEALS/ADHESIVES

Curtain wall adhesives

An illustrated brochure, describing various types of adhesives and adhesive-bonding techniques used in the construction of "sandwich" panels, has been issued by Rubber & Asbestos Corp. A listing of over 50 different types of skins and cores used given, with illustrations and descriptions of bonding techniques under five general classifications: (1) "hot contact bonding" with specially formulated neoprene adhesives; (2) "heat and pressure" bonding with thermosetting adhesives; (3) aircraft honeycomb "sandwich" panels produced with 100 per cent reactive, solvent-free epoxy adhesive systems; (4) panels produced with cores of foam polystyrene which have been bonded with reclaim rubber adhesives, and (5) with 100 per cent reactive, solvent-free modified epoxy formulations. (16 pp.)

AIA file no. 24-E

MFR: RUBBER & ASBESTOS CORP.
Circle 286

Sealants

David E. Long Corp. announces its synthetic rubber compound for caulking, glazing and sealing in recent literature. For both interior and exterior uses, on new constructions and for maintenance of existing buildings. Product is waterproof and non-shrinking, easily applied and maintains resiliency from plus 250°F to minus 100°F. Application data and price list included. (12 pp.)

AIA file no. 24-E

MFR: DAVID E. LONG CORP.
Circle 287

Adhesives

Miracle Adhesives Corp. has issued a pamphlet containing descriptive and technical information on adhesives for insulating materials. Emphasized are surface anchors, insulation fasteners, coatings and sealers and "Poured-In-Place" insulation. (4 pp.)

AIA file no. 17-F-1

MFR: MIRACLE ADHESIVES CORP.
Circle 288

HARDWARE

Finishing hardware

Lockwood Hardware Manufacturing Co. introduces its "Jamaica" lockset in a recent bulletin. Included are Lockwood locksets for interior and exterior doors, closet, passage, porch, bath and bedroom, etc. Mfr claims extra strength and security for product. Included are available finishes and shipping information. (single sheet)

AIA file no. 27-B

MFR: LOCKWOOD HARDWARE MFG. CO.
Circle 289

Finish hardware

Locks, latches, door closers, door holders and mortise locks are described and illustrated in a booklet from Russwin. Chart emphasizes products' suitability for school, college and other institutional buildings. (4 pp.)

AIA file no. 27-B

MFR: RUSSWIN
Circle 290

documents

ASTM Standards. *1959. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.*

Ferrous Metals Specifications *(Except Test Methods), 1959. 1620 pp., 291 standards, $12.00.*
Circle 150 for further information

Plastics, Electrical Insulation, Rubber, Carbon Black, *1959. 2056 pp., 380 standards, $14.00.*
Circle 151 for further information

Effect of Water on Bituminous Paving Mixtures, STP 240, *102 pp., $2.75.*
Circle 152 for further information

Metals Test Methods *(Except Chemical Analysis), 1959. 992 pp., 121 standards, $10.00.*
Circle 153 for further information

Bituminous Materials for Highway Construction, Waterproofing, and Roofing, *488 pp., $4.75.*
Contains 129 standard specification, methods of test, recommended procedures and definitions.
Circle 154 for further information

Cement, Concrete, Mortars, Road Materials, Waterproofing, Soils, *1959. 1456 pp., 338 standards, $10.00.*
Circle 155 for further information

Piping Materials, Steel Compilation of Standards on-.
Standards covering steel pipe, tubing, castings, forgings, bolting and related materials used in piping installations. Those concerned with pressure piping, power generating, find the book a decided convenience. There are over 60 specifications. 468 pp. 1958 edition supersedes earlier issue. Paper cover, $5.00.
Circle 156 for further information

Compilation of ASTM Standards on Cement, *278 pp., $3.50.*
Includes standard specifications, methods of test, definitions, Manual of Cement Testing, selected references and discussion of analytical balances and weights.
Circle 157 for further information

Masonry Products, Ceramics, Thermal Insulation, Sandwich and Building Constructions, Acoustical Materials, Fire Tests, *1959. 1142 pp., 210 standards, $12.00.*
Circle 158 for further information

NEMA Standards. *1959. National Electrical Manufacturers Assn., 155 East 44th St., New York 17, N. Y.*

NEMA Standards Publication for Precision Snap-acting Switches, *IC 3-1959. $.30.*
Circle 159 for further information

NEMA Standards Publication for Color Coding of Wires and Cables, *WC-1959. $.30.*
Circle 160 for further information

Rubber-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy, *WC 3-1959. $4.00.*
Contains detailed information on conductors, insulation, shielding and coverings, cabling, fillers, binders and circuit identification, testing and test methods, pole and bracket cable, etc.
Circle 161 for further information

NEMA Standards Publication for Identification of Covered Arc-welding Electrodes, *EW 2-1959. $.75.*
Circle 162 for further information

NEMA Standards Publication for Quick Connect Terminals, *DC 2-1959. No charge.*
Circle 163 for further information

American Standard Requirements for Residential Wiring. *National Wiring Bureau, 155 East 44th St., New York 17, N. Y. No charge.*
Circle 164 for further information

1959 Heating Ventilating Air Conditioning Guide, 37th Edition. *American Society of Heating Refrigerating and Air-Conditioning Engineers, 62 Worth St., New York 13, N. Y. Cloth bound, $12.00.*
Contains larger illustrations, working charts and tables, and new or revised diagrams and charts. Similar to previous editions, contains also high temperature watersystems, heat pumps, evaporative air cooling and humidification and snow melting. Beneficial to engineers, contractors, educators and students.

Circle 165 for further information

1958 Research Houses. *Research Institute, National Assn. of Home Builders, 1625 L St., N. W., Washington 6, D. C. Two booklets, $2.00 each.*
Describe varied details of the research houses built by NAHB. Profusely illustrated, booklets contain technical information on materials, equipment and construction methods used.

Circle 166 for further information

BRI National Academy of Sciences, *2101 Constitution Ave., Washington 25, D. C.*

Installation and Maintenance of Resilient Smooth-Surface Flooring. *145 pp., $5.00.*
Survey of national flooring problems and suggested solutions. Contains unique chart comparing physical properties, standard dimensions, installed cost psf and use level at which each material may perform successfully, whether on, above or below grade.

Circle 167 for further information

Windows and Glass in the Exterior of Buildings. *1957. 176 pp., illus., $5.00.*
Considers the effects of the use of glass areas on daylighting, air conditioning, heating, ventilating, interior and exterior controls, window and glass production and the architectural design of residential, commercial and institutional buildings.

Circle 168 for further information

NEW— 52-PAGE BULLETIN ON

LACLEDE STRAIGHT CHORD STEEL JOISTS

"S" AND "L" SERIES

COMPLETE INFORMATION INCLUDING

Design and Construction Features
Dimensions and Specifications
Load and Spacing Tables
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CITY _____ ZONE ___ STATE _____

Circle 140 for further information

INTEGRATING ILLUMINATION

(*Continued from page 10*)

(f) Methods of installation related to structure and methods of electrical distribution.

Mr. Phillips suggests the above to enable the architect in attaining better rapport with the lighting engineer. However, few schools of architecture in the United States have a curriculum providing such a course of study. Even a so-called "elective" course is hard to find. Needless to say, it would be difficult to introduce such a course into established curricula already packed with all that a student can handle.

For the lighting engineer, Mr. Phillips points out that such a course of study is just the starting point for complementary or parallel training. It is necessary to improve the engineer's basic knowledge and ability to communicate to the architect in their common and mutually conditioned efforts. Therefore, he suggests the following course for the "artist-engineer":

(a) Systems of structure and building techniques. This would include methods of support for ceilings and lighting equipment, and a knowledge of new forms of structure, such as shell concrete. Relationships of structure to lighting equipment and methods of electrical distribution.

(b) Allied servicing: acoustics, heating and ventilation, sprinklers, to the extent that these relate to lighting equipment.

(c) Modular building materials coordination.

(d) Architectural design. History of its development, theory and practice.

(e) Interior decoration: use of color and materials.

Phillips states further that "the recommendations outlined above are made first to ensure that the architect will have a comparable knowledge of lighting to that which he should possess of structure, to enable him to think in terms of lighting in the initial stages of design, and to avoid asking the impossible of the lighting engineer; and secondly, to assist the lighting engineer to acquire a sensitivity toward the architecture of any period. One of the chief complaints of the architect is that the lighting engineer has ruined his building by putting in an unrelated lighting scheme. This should not be possible when the architect knows what he wants, and sees that he gets this, and not, what lack of foresight, lack of suitable standard equipment, or lack of time might force him to accept."

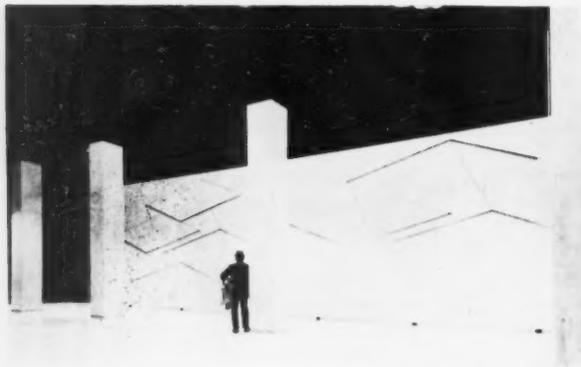
In the United States, the prospect of expanding this form of education for the professional consulting engineer is not readily at hand. Generally, we find that the lighting design performed by most consulting engineering firms falls on the shoulders of the electrical engineer, who, as one professor in an eastern university has said, "has acquired control of illuminating engineering by *default*." Most past graduates of specialized curricula are employed by firms other than consulting firms. Accordingly, they are not directly available to architects. Further, electrical engineers in contemporary practice have generally been exposed to only a minimum of formal training in illumination. This training tends to consider primarily the *mechanistic concepts* involved in the application of standard equipment for illumination levels based on the efficacy of human performance alone. This training contributes little understanding to those elements of professional concern to the architect. As an example, the new lighting levels recommended by the Illuminating Engineering Society based purely on performance have been slow to gain general acceptance among architects.

At the university level, the education of illuminating engineers shows signs of deterioration, rather than improvement at the date of this writing. Illumination, usually considered an offshoot of the "power option" in electrical engineering, is practically defunct because of the headlong rush of students toward electronics—which has "glamour" status and the attraction of higher pay. Only one elective course in illuminating engineering is available today in New York City—a remarkable fact in the nation's largest city. A definite gap will appear within the next several years in the availability of engineers with good fundamental training in this field.

This may mean that architects will have fewer competent lighting consultants available and they may tend to rely more heavily on the aid of the non-professional lighting technician. Generally, this technician represents lighting equipment manufacturers. His specific scientific knowledge may be of the highest order with respect to his own equipment, but his ability to appreciate the over-all picture of the architectural problem may be seriously limited. Therefore, the onus of carrying the lighting design may be on the shoulders of the architect, much more than he is accustomed to at the present moment. Probably his best immediate remedial approach would be to improve his current means of communicating his ideas to the lighting profession.

Development of information and the ability to mutually solve lighting problems with consistent success by the architect and by the consulting engineer may not be completely realized because of the breakdown in basic communication—in this *inability* to transfer ideas. Attempts have been made in widely divergent directions to establish suitable terminology. To date, none of the efforts seem to have acquired complete acceptability on both sides of the professional fence. On the one extreme, the efforts by lighting researchers Moon and Spencer to establish a new and precise series of terms have received little encouragement from established practitioners in the lighting field. Certainly, their work has never received serious practical review by practitioners of architecture. Architects generally do not make wide use of the existing terminology involving "footcandles," "footlamberts" and "candlepower" with significant understanding. On the other hand, it remains to be seen whether terminology such as Richard Kelly's subjective descriptions of light "play," "ambient luminescence," "focal glow," and "play of brilliants" will enable those practitioners who deal with mechanistic concepts to transfer aesthetic ideas and architectural concepts effectively.

It would seem reasonable that the following considerations (mentioned above) merit further discussion by the architectural and consulting engineering professions: (1) A far greater correlation and integration of the professional aims of both the architect and the consulting engineer; (2) More flexibility in programming and greater preliminary planning to include the consultant; (3) Understanding of the significance and the new contributions that can be made by artificial illumination to architectural form; (4) Greater need for the architect to understand the underlying changes in illumination research and practice; (5) Communication of the standards of the architectural profession to the lighting consultant engineers. (6) Encouragement of professional schools to assist in this professional integration; (7) Greater clarity and simplicity in lighting terminology in order to facilitate professional utilization of science in lighting.



Lobby of the new Corning Glass Work's New York Office Building (left) depends on artificial light to dramatically utilize its reflecting black carrara glass ceiling and its Vermont marble column and wall surfaces. The incised mural, finished in gold leaf is described by its artist, Joseph Albers, as "Structural Constellations." Architects are Harrison and Abramovitz and Abbe. At right, one of the building's conference rooms uses a series of coordinated lighting panels that may be individually controlled or in banks.

books

ELECTRICAL ENGINEERING MATERIALS *by A. J. Dekker. New York: Prentice-Hall, Inc., 1959. 208 pp. $8.00.*

Reviewed by:
Henry Wald, PE

This book will be used most effectively as a teaching tool, most directly applicable for students emphasizing electrical engineering. In line, therefore, with the increased emphasis on fundamentals, rather than specialized training on the university level, it should serve well as a basic reference work. The style of writing lends itself to clear exposition of the numerous models that are explained. Electrical engineers may want to consider this reference for addition to a library of fundamental properties of materials.

** Mr. Wald is a Consulting Engineer in private practice. His article,* Integrating Illumination, *appears in this issue.*

Electronic Fundamentals & Applications, *Second Edition, by John D. Ryder. Englewood Cliffs, N. J.: Prentice-Hall Inc., 1959. 765 pp., illus. $13.35.*
Reviewed by:
*Lawrence Eisenberg**

This book is thorough in its coverage of basic electronic circuitry and lucid in exposition. It will however be of limited value to those engineers not engaged in electronic design. The author discusses applications ranging from audio to radio frequencies with a particularly fresh approach to transistor circuits. Chapter VII on four terminal active networks is an excellent preparation for handling the circuit analysis of transistor and vacuum tube models. The author adopts a unified approach to both transistor and vacuum tube circuits which is a welcome innovation in current textbooks. Chapter VIII, although brief, is the best introduction to transistor models this reviewer has seen.

** Mr. Eisenberg is an Electronic Engineer with the Rockefeller Institute.*

(Continued on page 39)

names

GEORGE DEWEY CLYDE
Governor of Utah

George Dewey Clyde, Governor of Utah (elected November 1956), is one of the few engineers holding high political office. As an engineer, he has spent a lifetime in the study of water problems, particularly the irrigation of semi-arid and arid lands. His entry in the 1956 Gubernatorial race was his first venture into politics.

The Governor, an active member of ASCE for many years, recently addressed its Los Angeles convention on the subject, "Government, the Engineer and the Future."

Governor Clyde brings expertness to his subject with a career in engineering and water development which has spanned more than 30 years.

Highlights of his career embrace 22 years of engineering teaching, experimental research, service as Dean of the School of Engineering and Technology of Utah State Agricultural College and many professional engineering and distinguished governmental administrative responsibilities. His services to professional engineering education have received academic recognition in his Honorary Doctor of Law Degrees from Westminster College and Utah State University.

Born July 21, 1898 of a Pioneer Utah family, he grew up on an irrigated farm near Springville, Utah, and he early learned the problems of making a productive farm by adding precious water to what had previously been desert land. In his boyhood, "the shovel and the lantern were farm tools as common as the plow and the hoe." Getting up at midnight to turn irrigation water over the land—a farmer took his turn at using the irrigation ditch at whatever hour it might come—was a normal "chore" over the years.

He is married to the former Ora Packard, his high school sweetheart, and the couple have five children, three of whom have followed their father's footsteps in selecting engineering as a career.

CLARK A. DUNN, PE

Clark A. Dunn brings to his present post as President of the National Society of Professional Engineers, a rich experience in administration to cope with the countless demands of his high office.

A South Dakotan by birth, now residing in Stillwater, Oklahoma, Dunn received his professional education at the University of Wisconsin, Oklahoma A&M College and Cornell University where he earned his Ph. D. in civil engineering.

Professionally, his experience includes work with both the South Dakota and Arkansas highway departments. He has served as consultant and adviser for several municipalities in Oklahoma, the Oklahoma Conservation Board, the Oklahoma Planning and Resources Board and the Army General Task Force Frigid project at Fairbanks, Alaska.

Besides the NSPE presidency, he is Executive Director of the Office of Engineering Research and a professor of civil engineering at the Collge of Engineering, Oklahoma State University. Dunn has also served as President of the Oklahoma Society of Professional Engineers, as a member of the Board of Directors of NSPE and two terms as NSPE Vice-President.

Among his professional affiliations, he includes the American Society for Engineering Education, director of the Engineering College Research Council, the Advisory Committee of the National Conference on Administration of Research and the American Society of Civil Engineers.

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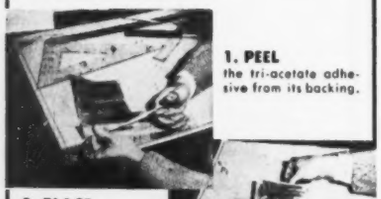

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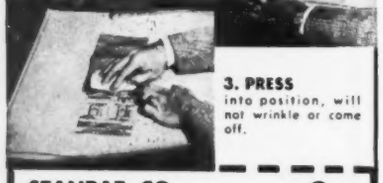

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LIGHT FOR LIVING

(Continued from page 14)

travel, against the flat angle light from overcast diffusing skies, or against artificial light from similar directions. Man's eyebrows, his opaque forehead, and the top of his head protect him against sun travel in the arc of 35° from the vertical. This fact suggests that man originated in the region of the earth where the lowest arc of sun travel is about 35°, or thereabouts from the zenith. This agrees with the generally accepted conclusion that man originated somewhere along the 70°F annual isotherm where it crosses land masses.

Apart from the unbalanced distribution of light that is characteristic of excessive diffusion, that is, apart from the excessive proportion of flat angle light in such distributions, the visual system is not equipped to extract the necessary information from a field of view lighted by total "shadowless" diffusion. "Shadowless" lighting is held to be ideal by some people because its uniformity is comfortable, and just as a general moderate noise level may be comfortable, and preferable to silence; but just as this noise level may mask sonic information, so also does the "noise" of diffusion mask visual information as illustrated in *figure 7*.

The second aspect of reflected glare, in which an image of a light source is reflected from the working area, is called "distraction." The distraction effect is obvious. It is deliberately sought in some situations where it can be an aid in detecting flaws in shiny materials. In general, it is not an aid, but tends to mask the details the eye is trying to see; or when it is not directly on the work, but nearby, it tends to lead the eye from the task by its phototropic effect. Obviously, where there is a choice of surface finishes, as usually there is, shiny surfaces should be avoided in work areas.

Shadow is another of the "quality in lighting" factors that has not been satisfactorily pinned down. The general statement can be made that shadows interfere with the revelation of visual information when they are too dense to see into, or too faint to shape form or mark distance distinctly, but there are exceptions. Sometimes, for example, the direction in which the shadow is cast, independent of its relative density, may determine whether it interferes with or assists vision.

A quantitative check of shadow densities versus their role in concealing or revealing visual information, reported to the International Congress on Illumination in 1955, indicated that shadows should be approximately 40 to 60 per cent as bright as the unshaded areas surrounding them.

Pierre Merz in his "*Information Theory Impact on Modern Communications*," (*Electrical Engineering, vol. 76, no. 8, pp. 659-664*) points out that ". . . there are two aspects to the development of communications systems," namely the invention of the fundamental equipment and the analytical study of the use to be made of the equipment, with its "feedback" effect in optimizing the equipment. This is also true of lighting systems. Artificial light sources and their accessories were first invented. Then their effects in revealing a field of view were analyzed. Finally, the equipment has been improved in the light of the analytical study of its effects. With respect to light sources, the improvements have been largely in the direction of: (1) Greater efficiency in the conversion of electrical energy into luminous radiation, thereby permitting higher levels of illumination with clearer revelation of the field of view. (2) Better color of the emitted light leading to more faithful rendition of the appearance of things. (3) Longer useful life, which assists in reducing production and maintenance costs.

With respect to the accessories, the improvements have moved in the direction of: (1) More varied types of control of the emitted light, permitting the lighting pattern to reveal more effectively the special features that should be recognized in particular fields of view. (2) More accurate control to reduce glare and increase output in preferred directions. (3) Mechanical improvements that reduce capital costs, installation costs, and maintenance costs.

Value judgments

While there is yet no quantitative measure of the over-all relevant *information potentially recoverable* from an artificially lighted field of view and no quantitative measure of the information actually revealed under various conditions, some quantitative knowledge of the effect of the various factors acting independently of each other is available. For example, some data is available on the effects of the quantity of light; also on the effects on the distribution pattern, direct glare, reflected glare and shadow. The choice of the best lighting system for a given field of view (office, store, gymnasium, schoolroom, library, etc.) therefore becomes a matter of *intuitional optimizing on the basis of economic equilibrium*. That is to say, it becomes a matter of judging empirically the value of various degrees of application of the factors mentioned, in the light of the cost needed to attain those degrees of application.

Aesthetic factors

For those readers who feel that a discussion of aesthetic factors has been ignored, it should be pointed out that this comes under the heading of "emotions" as referred to earlier in the article. Lighting systems should be designed to excite or evoke satisfactory "emotional" responses. There is a category of aesthetic data that should be designed into the environment, into the lighting system to the extent that it is a visible feature of the environment, and into the application of the lighting system so that it reveals the essential aesthetic data.

books

(Continued from page 37)

Architecture of Today: *A Survey of New Building Throughout the World by Udo Kultermann. New York: Universe Books, 1959. 236 pp., illus. $9.50.*

Looking At Architecture in Canada *by Alan Gowans. New York: Oxford University Press, 1959. 232 pp., illus. $9.50.*

Creativity: An Examination of the Creative Process, *edited by Paul Smith. New York: Hastings House, 1959. 210 pp., illus. $4.95.*
A report on the third conference on communications of the Art Directors Club of New York.

Architecture in the California Missions *with text by Kurt Baer, photographs by Hugo P. Rudinger. Berkeley: University of California Press, 1959. 216 pp., 128 illus. $10.00.*

The Contemporary Curtain Wall *by William Dudley Hunt, Jr., AIA. New York: F. W. Dodge Corp., 1958. 454 pp., illus. $12.75.*
The contemporary curtain wall—its functional elements, materials and methods of assembly are discussed.

Films

Buildings for Business *produced by the American Institute of Architects as a fourth in its current series. Price per film is $65.00; rental per showing, $5.00. Sound, 16 mm., running time: 13½ min. Cleared for television use.*
The architect's role in the design and execution of commercial and industrial structures is explained. Effective curtain-raiser for talk to groups.

Lights—As You Like It *produced by Transfilm, Inc., for the Superior Electric Co. Available on loan through Communications Counselors, Inc., 750 Third Ave., New York 17, N. Y. Sound, 16 mm., color, running time: 24 min.*

LIGHTWEIGHT STRUCTURAL CONCRETE digest:5

A/E NEWS REPORT: Lightweight concrete. A review of general facts and essentials is given in this digest based on a talk delivered by Harold S. Woodward, Partner in the firm of Seelye, Stevenson, Value and Knecht, Consulting Engineers of New York, to a meeting of the Concrete Industry Board of New York.

CLASSIFICATIONS

1. Common rocks which are light enough in their natural condition to be used without processing, except for crushing and sizing. Includes pumice, scoria, volcanic cinders, tuff and diatomite.
2. Minerals of crystalline structure which, when heated, explode and produce a very light, fluffy substance of little strength. Includes obsidian, perlite and exfoliated mica.
3. Aggregates produced as by products, such as sintered fly ash, expanded fly ash, expanded blast furnace slag and coal cinders.
4. Expanded clays, shales and slates which are produced by heating in a rotary kiln or sintering machine to about 2000° F, then clinkered, crushed and screened to size.

HAYDITE

This later type (item no. 4, above) is the only structural concrete of the four groups, as it is the only one that can develop satisfactory compressive strengths without excessive cement factors. *Haydite*, named after Stephen J. Hayde, who patented the process in 1918, was used in some ships during World War I, but the impetus to large scale use was from the shipbuilding program of World War II.

Commencing in 1946, the lightweight concrete industry grew rapidly in Texas. A great amount of research and promotional work was done by industry. Today, there are approximately 30 plants in the United States and Canada producing *Haydite* type aggregates by the rotary kiln process. There are others producing lightweight aggregate by the sintering process.

On the Pacific coast, the use of lightweight concrete has increased considerably since the war. In 1932, it was thought that it could be used economically on buildings ten stories and higher, whereas at this time, it is being selected for use in buildings no higher than six stories. It is being used to a greater extent in multi-story construction whether the building has a steel frame or is entirely of reinforced concrete. There are several multi-story steel frame office buildings now being erected in the Bay area in which lightweight concrete is being used. The new 14 story *John Hancock Mutual Life Insurance Co. Building* (by Architects: Skidmore, Owings & Merrill) is entirely of lightweight reinforced concrete for all of the structure above grade.

FIRE RESISTANT QUALITIES

The fire resistant qualities of this lightweight concrete are much higher than that of the natural aggregate. When used with aluminous cements it may be used as a refractory material in circumstances requiring resistance to temperatures exceeding 2,000° F. For a given slab thickness, fire endurance is about 90 per cent higher than for sand and gravel concrete.

ABRASIVE QUALITIES

For abrasion, lightweight concrete shows superior qualities. For example, the Eleventh Street Bridge in Tacoma, Wash., has the original brush marks still visible in the surface of the expanded shale concrete deck after being exposed to daily traffic of 35,000 to 40,000 cars and trucks for more than ten years. No protective covering over the concrete is required for this use.

FACTORS OF ECONOMY

Of course, lightweight concrete may not be economical for every structure. Its weight varies from 90 to 110 pounds per cubic foot as compared to 150 pounds for stone concrete. Where a reduction in weight is of prime importance, its use should be considered. Even a building of limited height might show a saving if there are large spans and pile foundations. Also where existing foundations must be used, more stories may be possible with the use of lightweight.

PROPRIETARY NAMES

Various trade names are given to *Haydite* aggregates by different manufacturers. Some of these are: *Gravelite, Lelite, Solite, Aglite, Rocklite, Baselite, Idealite, Calite and Norlite.* Manufacturers turn out distinctly different materials as far as appearance is concerned. Generally a manufacturer's product may be recognized by the appearance of his aggregate. This is due to the variation in the type of shale or clay used. The color may vary from very dark gray to a reddish shade. The texture may vary from a clinker appearance created in the sintering process to a rounded smooth shape. The shape of the aggregate is one reason why the amount of fines and air vary within the different aggregates.

STRENGTHS

Some may doubt the ability to make an aggregate lighter and still get a strong concrete strength as for stone concrete. The answer lies in that the strength of the concrete lies in the strength of the paste. Since this is the case, there is no difficulty in getting reasonable strengths. In comparing the strengths of light and heavyweight concrete, it should be remembered that the water-cement ratio law operates for both and comparison must be made using sharp angular coarse concrete in both cases with a maximum size of ¾ inch.

MIXES

Mixes for lightweight differ in several aspects from heavyweight concrete. Most important is that the lightweight has an absorption which is an extremely elusive and variable property. Principally it is affected by whether or not the aggregate contains an initial moisture content at the beginning. Also it is affected by the length of time the initial moisture has been in the aggregate. The critical absorption is not necessarily the total absorption, but rather the absorption which takes place during mixing, conveying and placing the concrete. This varies from job to job and even by different pours on the same job. While this is a minor factor with heavyweight concrete, it is *very important* in dealing with lightweight aggregates. Aggregates which contain some initial moisture at the beginning have greater absorption than moisture free. True absorption of expanded shales ranges from 7 per cent for coarse to 20 per cent for fines and for clay aggregates, 16 per cent for coarse to 25 per cent for fines.

digest: 5

PRACTICAL CONSIDERATIONS

Those not familiar with this type of concrete may be reluctant to use it because it is harsh and unmanageable when compared with the usual stone concrete mix. So these points may prove informative:

1. Material is apt to segregate in transportation and stock piling; therefore, uniform concrete can usually be produced more easily with separate fine and coarse aggregate rather than a blended mix.
2. At least twice as many fines should be used as in heavyweight concrete. At least 50 to 65 percent by volume of total aggregate should be fines. Percentage of fines should be the lowest possible amount which can be used with lowest possible air to provide workability. An actual deficiency of fines should be avoided because fine material has greater density than coarse and is important for attaining strength.
3. Lightweight aggregate is so sharp and angular it is impractical to obtain good workability by using fines only. One gets too low strengths with normal cement factors.
4. Some internal lubrication necessary for additional workability. Air entraining usually used for this purpose.
5. Slumps are not comparable to those for heavy concrete. For equivalent workability this concrete may have 2 or 3 inches less slump than heavy.
6. The amount of air entraining used for best results should be about twice the amount considered good practice for heavyweight concrete. Air entraining cements do not produce sufficient air. Usual percentage used is 6 to 8. From 1 to 2 oz. per bag of cement per cubic yard usually added. As top size of aggregate is reduced, proportionately more entrained air is necessary. For given volume of air, reduction in strength is about half as much for small aggregate as for large, or, putting it another way, twice as much air can be entrained in small aggregate with same loss in strength as for large aggregate.
7. Retarding densifiers usually necessary additives; not only add strength to concrete, but also retard the set. Latter factor most important in hot weather where monolithic finishes are necessary, or where large pours might make cold joints a problem.

AIR ENTRAINMENT

Air entrainment is an important ingredient in the lightweight mix. Air entrainment may be defined as the incorporation in the concrete of innumerable bubbles of air having average diameters of from .001 to .002 of an inch. These spheroids of air form and cluster mainly around grains of the fine aggregate between No. 30 and No. 100 sieves. Practically none form on finer particles or on cement of a coarse aggregate. Air functions as lubricant and plasticizer. Rounded particles contain more air than angular. Due to the fact that there are more fines in the lightweight mix, more air entrainment is possible without same reduction in strength than would be obtained with stone concrete mix.

Many secondary factors affect the nature and extent of air entrainment in relation to the amount of agent used. Some of these are:

1. *Shape and size of aggregate particles:* Rounded particles entrain more air than angular. The sizes of particles stated above carry the air bubbles.
2. *Richness of mix:* Entrainment is less for rich mixtures and for finely ground cements.
3. *Temperature:* Coolness favors greater entrainment.
4. *Slump:* The larger slumps give loss of entrained air.
5. *Mixing:* Undermixing tends to reduce the air and overmixing tends to lose air.
6. *Placement and hauling:* Long hauls and delayed placement tend toward loss of air.
7. *Other admixtures and impurities:* Carbon, fly ash, calcium chloride and other substances tend to reduce air entrainment.

HANDLING LIGHTWEIGHT AGGREGATE

The aggregate should be sprayed when on conveyors leading from production plant to cars or trucks. Then moisture tests should be run on the stockpile at the ready-mix plant and amount found added to design weights for batching weights and corresponding amount of water deducted from amount of mixing water added. Absorbed water is not available to cement in the mix during the *setting processes;* and therefore has no influence on the water-cement ratio of mix.

Where the batching arrangement is so that aggregate and cement cannot be batched separately, it is best to run aggregate into weigh-batcher first and put cement on top.

Before discharging on the job, truck mixer should run for at least 30 seconds at mixing speed, thereby eliminating segregation since coarse aggregate is lighter than fines.

EXAMPLE OF USE

It may be interesting to know some of the results obtained with a coated aggregate manufactured in Colorado. One can obtain a concrete having a strength of 3,000 lbs. at 28 days with 4.8 bags of cement a yard. This concrete weighs about 92 lb./cu. ft. Tests for prestressed concrete of 5,000 psi or over have an average dry weight of 100 p.c.f. There is no trouble getting strengths around 7,000 psi for this concrete. Shrinkage tests showed about the same as stone concrete.

Laboratory tests seem to indicate that shrinkage of lightweight concrete in general is greater than heavyweight. However, in the field it has been observed that one gets less cracking due to shrinkage. This may be due to entrapped water which keeps concrete in somewhat moist condition for longer period of time. Absorbed water in the aggregate is held within particles during initial hardening reaction of cement and as cement paste dries out, the 11-32 gal. of entrapped moisture becomes available to cement paste as moisture equilibrium within the concrete.

COST COMPARISONS

How does lightweight concrete compare in cost with the heavy. At Eastern Air Lines Terminal at Idlewild the difference is $2.65 per cu. yd. This is using sand for the fines. In Texas and the southwest premium for lightweight varies from $2.50 to $5.00 per cu. yd.; partly due to increased cement factor which is generally about one-half bag per cu. yd., which adds about 50 cents. Variation of this differential is due primarily to variable prices of the ordinary concrete in various areas. On Pacific coast lightweight costs around 40 to 50 per cent more.

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18-21 BUILDING OFFICIALS CONF OF AMERICA, INC: convention, St. Paul, Minn.

20-21 BUILDING RESEARCH INST: conference on building illumination, Statler-Hilton Hotel, Cleveland, Ohio.

25-28 DESIGN ENGR SHOW: and fourth design engineering conference, Convention Hall, Philadelphia, Pa.

25-26 SOC OF THE PLASTICS INDUSTRY: SPI cellular plastics div. furniture conference, Sedgefield Inn, Greensboro, N. C.

June 4-5 ILLUMINATING ENGR SOC: northeastern regional meeting, Curtis Hotel, Lenox, Mass.

7-11 AMERICAN SOC OF HEATING AND AC ENGRS: semi-annual meeting, Vancouver, B. C.

7-19 AMERICAN INST OF ARCHITECTS AND ASSN OF COLLEGIATE SCHOOLS OF ARCHITECTURE: teacher's seminar, Grindstone Lake, Wisc.

11-13 NEW JERSEY CHAPTER, AMERICAN INST OF ARCHITECTS and NEW JERSEY SOC OF ARCHITECTS: convention on planning is architecture, Berkeley Carteret Hotel, Asbury Park, N. J.

21-26 AMERICAN SOC FOR TESTING MATERIALS: annual meeting Chalfonte-Haddon Hall, Atlantic City, N. J.

22-23 ILLUMINATING ENGR SOC: Great Lakes regional meeting, Statler Hotel, Muffalo, N. Y.

22-24 AMERICAN SOC OF REFRIGERATING ENGRS: annual meeting, Lake Placid Club, Lake Placid, N. Y.

22-26 AMERICAN INST OF ARCHITECTS: annual convention with design theme, New Orleans, La.

22-26 AMERICAN SOC FOR ENGR EDUCATION AND ASTM: joint symposium on education in materials, Atlantic City, N. J.

24-25 ASPHALT INST: mid-year meeting, Hotel del Coronado, San Diego, Calif.

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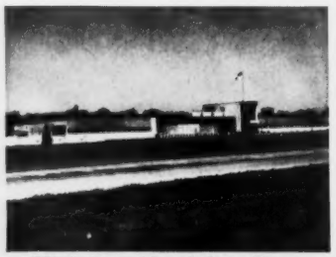

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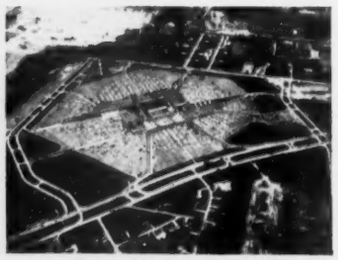

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